A Back Country Management Plan

for

SEQUOIA and KINGS CANYON National Parks

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

A BACK COUNTRY MANAGEMENT PLAN

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DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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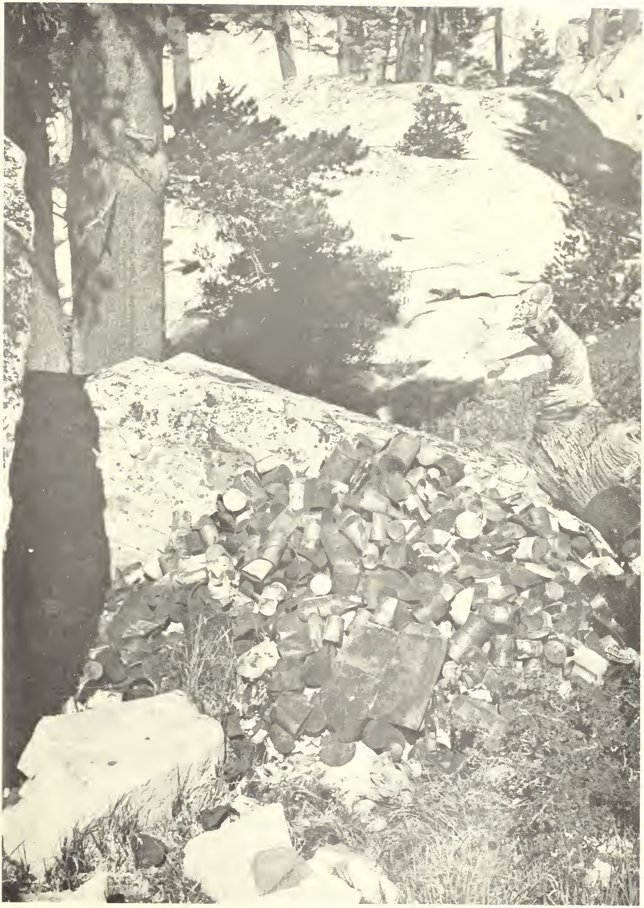


Fig. 1 In its 1960 cleanup campaign, the National Park Service removed over 20 tons of litter from the back country of Sequoia and Kings Canyon National Parks.

INTRODUCTION

Increasingly heavy use of back-country wilderness in Sequoia and Kings Canyon National Parks has jeopardized meadows, lake shores, live trees and campsites. It has created a monumental litter problem and impaired the original wilderness atmosphere. The National Park Service is increasingly concerned over the situation in these National Parks, and in others as well. Symptoms of intensifying human use, in this and related guises, confront nearly all public land agencies today.

Deterioration caused by recreational use of near-saturation proportions is being hastened by rapid increases in population size, mobility and leisure time, but the problem is not a new one. In the Sierra Nevada of California, wilderness use problems from Lake Tahoe to Tehachapi Pass have been under prolonged observation by various organizations.

In 1960, the United States Forest Service distributed for administrative use a summary of an eight year study of this subject, conducted by Arnold P. Snyder in the High Sierra Ranger District of the Sierra National Forest (Snyder, 1960). Yosemite National Park began studies of back-country use problems in 1935; Sequoia and Kings Canyon National Parks did likewise in 1940 (Sumner and Leonard, 1947). Several other parks followed suit as similar problems arose within their boundaries (see References, page 104).

Between 1940 and 1958, six different studies of back-country use were made in Sequoia and Kings Canyon National Parks. These were followed by research contracts in 1958 and 1959 with Dr. Carl Sharsmith of San Jose State College to determine whether ecological deterioration in the National Parks of the Sierra might become irreversible if not checked in the near future (Sharsmith, 1959, 1961).

The record of back-country use studies in Sequoia and Kings Canyon National Parks would be incomplete without mention of former Associate Director E. T. Scoyen, who actively encouraged wilderness preservation studies and protection measures in these Parks and throughout the Service.

In January 1960, Superintendent John M. Davis, Sequoia and Kings Canyon National Parks, requested that a statement of National Park Service policy on wilderness preservation and use, together with policy guidelines, be prepared for servicewide application. He also proposed that a detailed management plan be prepared specifically for the use and preservation of back-country wilderness in the parks under his administration.

A committee consisting of Maurice E. Thede, Regional Chief of Park Forest and Wildlife Protection, Western Region; Lowell Sumner, Principal Biologist, Washington Office, and William J. Briggle, District Park Ranger, Sequoia-Kings Canyon National Parks, was assigned these tasks. Concluding that no new policies were required, it confined its efforts to defining, in Part I of the original report, the objectives of back-country preservation and use within the framework of existing policy. The Committee also prepared, while actually on the ground, the practical details of an operation plan, summarized in Part II. Field work for this purpose was completed during the period July-September 1960, and complete descriptions of use problems and recommendations for the two parks were presented by the Committee in the report, "A Back-Country Management Plan for Sequoia and Kings Canyon National Parks," (April 1961, 200 pp., 29 illus., manuscript).

The present revised report contains all the general findings and recommendations of the original Part I, but Part II has been condensed so as to include detailed management plans for representative areas only. Some reference to current progress being made in other parks has been added. It is hoped that this revision will prove useful to other areas that have serious back-country problems.

PART I - GENERAL PRINCIPLES AND GUIDELINES

WILDERNESS DEFINED

To avoid misunderstanding, the definition of wilderness as used in this report has been taken from The National Park Wilderness (Stagner, 1957). It can be summed up thus: A wilderness is a large, undeveloped, wild area extending beyond roads and developments for permanent occupancy, in which one can experience solitude, quiet, beauty, a sense of adventure, and feelings of remoteness from modern civilization, including mechanized transportation--and in which the drama of natural forces is permitted to unfold without interference except for such management practices as may be required to counteract major destructive influences.

THE NEEDS OF SCIENCE

The value of wilderness for scientific research used to be largely ignored, or at least not mentioned in reports such as this one. But the dates and titles of hundreds of research publications show that for many years the national parks have been recognized by scientists from all over the world as areas uniquely qualified for basic research, by virtue of their unmodified wilderness characteristics. A landmark along the route toward the growing appreciation of wilderness as a scientific resource was reached with the publication, in 1960, of "The Meaning of Wilderness to Science," a book on which the National Park Service collaborated with distinguished representatives of other conservation and research organizations and institutions.

Since that time, a growing awareness of the unique contributions that unmodified park environments can make to basic research has been reflected in increasingly adequate budgets in support of research programs in the parks. This trend is adding a new dimension to the concept of wilderness protection, and the responsibilities of the National Park Service in that connection.

THE ULTIMATE AIM OF CONSERVATION

The ultimate aim of conservation is to leave our earth as rich and productive as we found it. William Dean Howells said, "A nation is great not because it mines coal, cuts timber or builds railways, but rather because it has learned how to produce, build and grow without destroying the bases of its future existence." (The Conservation Foundation, 1958).

The National Park System wilderness is a culmination of processes and events that have been unfolding since the beginning of time. It presents the story of the evolution of the American land, and of the development of life upon it. It is a never-ending story that will continue to unfold, for the inspiration and general welfare of mankind and the advancement of science, so long as the integrity of these "islands of nature" is maintained.

In 1956 an international symposium of scientists emphasized how profoundly man has changed the face of the earth. Man's influence in this respect was compared in magnitude to a major geological-ecological force (W. L. Thomas, Jr., 1956). In 1961 a conference in Switzerland of the International Union for the Conservation of Nature and Natural Resources, bringing together ecologists from 12 countries, concluded that the national parks of the world offer the principal future hope of preserving some scattered fragments of primeval nature for fundamental scientific research. The large primeval parks of the National Park System of the United States were declared to be preeminent in this respect, and of international significance and value. This idea has been reiterated at other international forums.

As our society continues to increase in complexity and in population, such an understanding of natural, balanced environments will become increasingly essential for developing ways of living harmoniously, rather than destructively, on our Nation's lands, which are not increasing in area.

Science needs these environments as a point of reference and as a yardstick with which to measure man's success or failure in the countless land-management programs that he carries out in the rest of his environment.

Gaining worldwide recognition and acceptance is the belief that National Parks, preserved as natural ecological entities, can supply man with a more complete understanding of the natural laws that may govern his future--and possibly his ultimate survival--in lands and environments everywhere.

WE ARE THE CUSTODIANS

"The Nation's most treasured wilderness lands are set apart and dedicated as National Parks and Monuments." By these words are we reminded, in The National Park Wilderness, of our responsibilities.

The custodians of a library are obligated to preserve the qualities and atmosphere of a library. In like degree, are we as one of the acknowledged national custodians of wilderness, obligated to preserve and manage the back country--as back country--for the enjoyment, education, physical and spiritual refreshment of our people, for basic scientific research, for an understanding of the natural laws that govern man's existence. Recognition of this obligation is the basis for the present report.

POPULATION TRENDS AND WILDERNESS USE

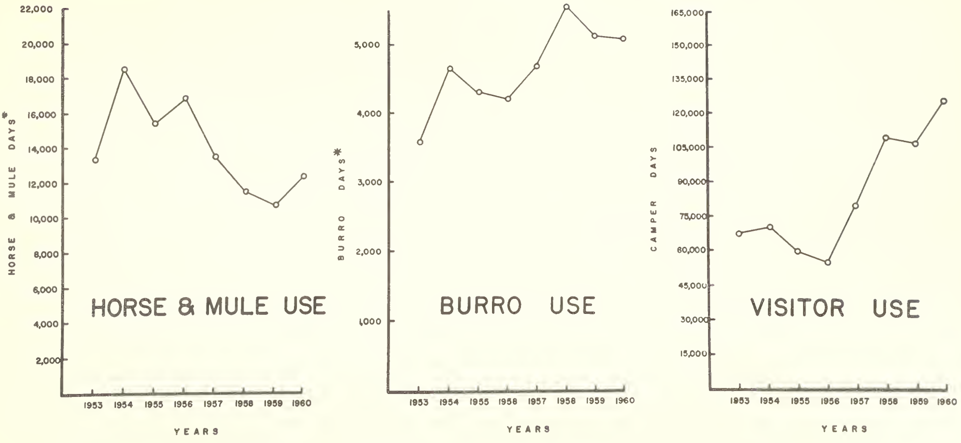
Every day there are 7,000 more people in the United States than there were the day before; every morning, in California alone, there are 1,600 more people having breakfast (Life, October 19, 1962, p. 69). Recreation and land use planners are faced with the fact that a U. S. population of

OF

BACK COUNTRY USE

1953—1960

SEQUOIA & KINGS CANYON NATIONAL PARKS



* REPRESENTS COMMERCIAL PACK STATIONS ONLY

Fig. 2.

100 million in 1920 grew to 180 million in 1960, is expected to reach 230 million in 1975, and 350 million by the year 2000.

Along with this anticipated quadrupling of the population in a period of about a century, there has already taken place an average increase in annual travel per person from 1500 miles in 1920 to 4700 miles in 1960. During this 40-year period, leisure time increased by nearly 40 percent, while use of state and national parks showed a more than sixfold increase, jumping from 50 million to over 331 million visits per year (Department of the Interior, "Fact Sheet," 1961). The rate of leisure-time increase can be expected to accelerate under the influence of automation.

Visitor use of the wilderness areas of Sequoia and Kings Canyon National Parks has nearly doubled since 1950. (Fig. 2.) The current and anticipated population growth in the State of California over the next 20 years precludes any thought that there will be a slackening off in the numbers of persons who visit the National Park wilderness of the Sierra.

THE BACK COUNTRY IS BECOMING THE FRONT COUNTRY

The gradual deterioration of Sierra meadows through overgrazing has been of serious concern as far back as 1940, when the first report was written concerning this problem in Sequoia and Kings Canyon National Parks.

Increasing visitor use has made serious inroads on the fish populations of many of the high lakes and streams. Most of the fish habitat in the parks is limited by various physical factors. In earlier times of light fishing pressure it was a fisherman's paradise, but its accessibility threatens to bring its own doom. In several places this has already occurred. As county and state roads push ever closer to the exterior boundaries of the parks, mass invasions of visitors will extend the heavy fishing pressure almost the entire length of the fertile zone of fish habitat.

In 1958, over three tons of litter were removed from just one of the more popular back-country areas. In 1960, a full-scale Service-sponsored program was launched to begin initial cleanup work; and at season's end over 20 tons had been hauled out (Briggle, 1960 a). (Fig. 1.)

The litter problem will always necessitate a program for back-country cleanup in much the same manner as litter is removed from front-country campgrounds, though it is hoped that wilderness users will show a greater sense of social responsibility in this regard than do the more predominantly urban users of park highways and other heavily developed facilities for motorists.

A review of these trends serves as a potent reminder that important areas of the parks that in an earlier day were wilderness or back country, now that they are easily accessible and serve heavy concentrations of visitors, are considered front country. The loss of the primeval wilderness qualities that appealed to an earlier generation of users has been gradual; some pockets of unchanged back country remain today, but they will suffer the same fate unless the trend is controlled soon. This report suggests ways to accomplish such control.

CARRYING CAPACITY DETERMINATIONS

Many deteriorating wilderness situations can be checked by appropriate management measures. But no management plan can be effective if it ignores the practical limitations of the natural environment. Ecologists point out that a basic requirement for intelligent management of any environment used by man, or influenced by him, is a determination of its "carrying capacity" (Fosberg, 1961).

This concept has long been applied with precision to the management of domestic livestock. Likewise, since the thirties, it has been standard procedure to base wildlife management programs on careful studies of the wildlife ranges to determine, and operate within, their carrying capacities. As human use of wilderness ranges begins to approach a saturation point, management has the responsibility of identifying basic factors that limit the carrying capacities of each area, and of tailoring the respective management programs to conform to these natural limitations.

When the present Committee determined from observation the minimum distance required for wilderness-type privacy between high country campsites, it was, in effect, determining the camper-carrying capacities of these areas (see Developed Campsites). Similar carrying-capacity determinations and judgments were

called for in preparing other phases of the management plan. Precedents and techniques for measuring wilderness carrying capacities are few; but present use trends clearly indicate the need for further application and refinement of known techniques, and the development of new ones.

WILDERNESS PROTECTION VS PERSONAL FREEDOM

Oldtime use of wilderness was completely free of restrictions. Wilderness explorers could hunt and fish without limit, cut down trees at will, camp, make fires and graze their stock anywhere. The tradition of personal freedom in wilderness dies hard, and one of the foremost endeavors of the National Park Service is to respect and preserve the personal freedom of the wilderness user to the fullest extent possible within the framework of each area's carrying capacity.

But when human populations expand they become subject to the biological limitations that govern other dense populations: The greater the number of individuals the greater the loss of individual freedom of action. An illustration of this in the daily lives of all of us is afforded by the congestion, delays, and complicated regulations on today's crowded highways.

Wilderness users may with justice complain that they seek wilderness to escape the regimentation of daily life. But the time is past, for example, when a Boy Scout can use his axe to cut fresh pine branches for his bed in the old tradition. Today we have no choice but to agree with Snyder (1961) when he suggests that, ". . . when we speak loosely of an 'untouched' wilderness we must actually be reconciled and receptive to an area managed in a degree relative to the number of people who enter it."

The Committee recognizes a major responsibility to preserve all possible freedom in wilderness, but feels that the answer to complaints over present day restrictions is not "Bureaucracy" but "Born too late."

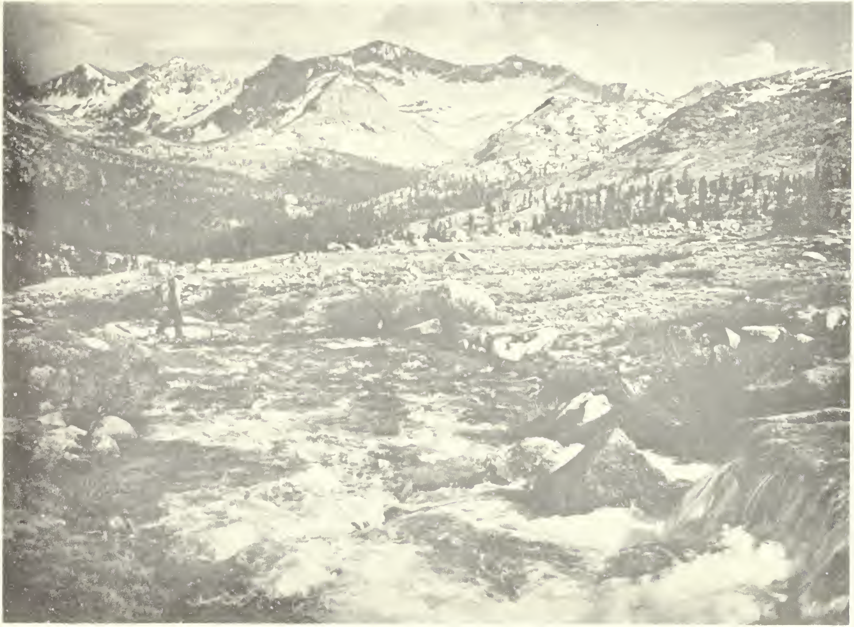


Fig. 3 The principal user of the vast wilderness of Sequoia and Kings Canyon National Parks is the backpacker.

WHO USES THE WILDERNESS?

In the Sierra there is a clear division of visitors into those who use stock and those who do not; and a further separation of stock users into those who walk and those who ride. Walking stock parties are more closely related in behavior and attitudes to the backpacker.

The principal users of the vast Sequoia and Kings Canyon National Parks wilderness are backpackers and this group has been found to be the least disturbing to wilderness values. (Fig. 3.) Backpackers, at least those who travel more than one day from a road, are usually well indoctrinated in wilderness practices. Since they are obliged to travel light they do not have much litter to leave behind. Their impact on meadows and trails also is relatively light. However, they are frequently guilty of discarding dirty clothing or leaving unused food behind.

Since the movements of backpackers are not limited by such factors as trails and forage, these wilderness travelers are likely to be found almost anywhere. A considerable volume of backpack use consists of Boy Scouts and organized church groups.

Walking stock parties usually consist of one or two people and a mule or two burros; but occasionally groups of 25 or more persons travel in this manner. (Fig. 4.) This type of wilderness use has increased noticeably in the last two years (see graph, Fig. 1). Problems do arise when walking stock parties concentrate at points of heavy use, and when they have insufficient knowledge of how to manage stock properly while traveling or grazing.

Riding stock parties rent stock from a commercial packer or bring their own animals. Rented pack and saddle stock usually is accompanied by a packer who is responsible not only for the stock but for the conduct of the people using the stock. This type of use is still flavored by the early attitudes and practices that prevailed when these natural areas were less used, and less endangered. In 1960, a total of over 12,000 horse and mule days of use was recorded for riding stock parties. Their average length of stay was 8.3 days. (Fig. 5.)

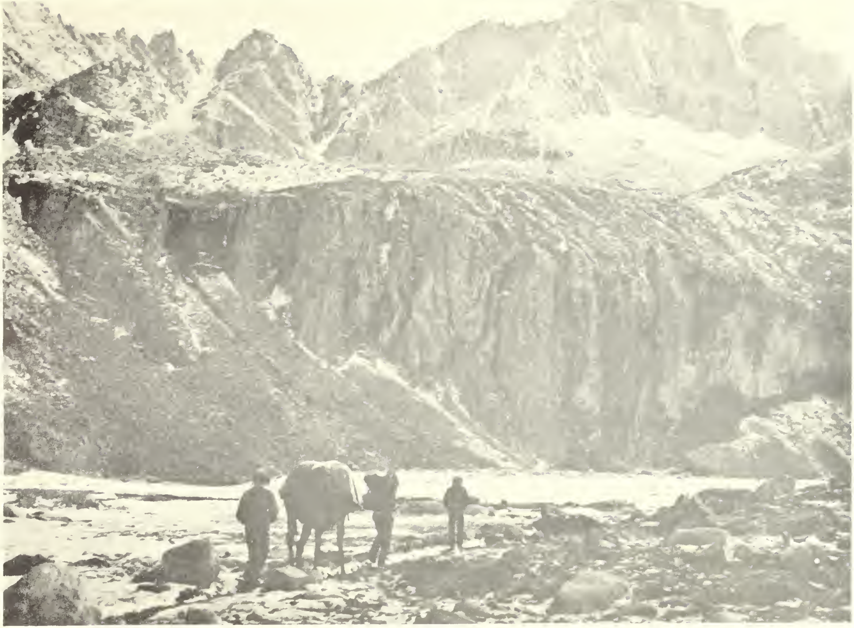


Fig. 4. A typical walking stock party.

Unfortunately, specific points of visitor interest, and limitations as to camping facilities in conjunction with stock forage tend to concentrate these riding stock parties. A few of these concentration areas can withstand fairly heavy use, but others require regulation of use to preserve even a minimum of vegetative cover. This report suggests ways to regulate such pack and saddle stock use.

In recent years, burros have been used increasingly for packing gear into the back country in preference to the more expensive saddle horse and pack mule trips. It is estimated that burro use will not fluctuate greatly, but will remain at about the 1959-60 level (Fig. 2). This level will be determined primarily by the fact that all available burros now owned by commercial pack outfits have been working to the fullest extent possible; and as indicated below, an increase in the number of burros in these parks is not favored because of the concentrated type of damage resulting from their being tied to pickets.

From a wilderness protection standpoint, the spot trip is the most desirable of all types of stock party use. This is a trip wherein the party is packed into an area of its choice, and remains there until the packer returns at a prearranged time.

The Committee has given special consideration to the growing problems connected with the use of burros. Next to walking and carrying one's supplies and dunnage, the burro is the cheapest means of transportation.

Burro use has been gaining ground over the past several years and will probably continue in popularity, despite the fact that commercial packers are not greatly in favor of these animals because they tend to eliminate some opportunities to sell the more profitable pack and saddle horse trips.

From the management and protection standpoint, several undesirable situations are created by the burro: The animals usually are left tied or tethered for too long a period at one spot, which results in local overgrazing, and eventual deterioration of a meadow. In addition, the people who rent the burro usually have little idea of how to manage the animal and often, through ignorance, mistreat it. Such practices as overloading, allowing a child to ride on top of the pack, and beating the animal because it won't move are common.

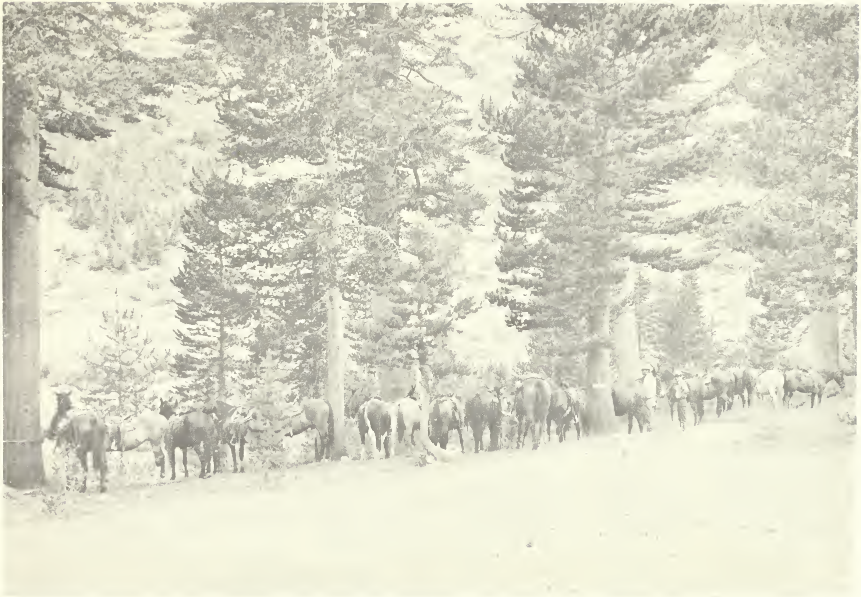


Fig. 5. Riding stock parties rent stock from a commercial packer or bring their own animals. This type of use is still flavored by early day practices and attitudes, which were less harmful when the wilderness received less concentrated pressure.

The practice of tethering or tying of burros for long periods has taken on serious proportions, and consequent meadow damage is common in the Sierra. One solution to this situation would be to require all burro or walking mule parties to turn loose their animals while grazing; but this would result in stock becoming lost, to the inconvenience and hardship of the party except in small areas with exceptionally tight drift fencing.

The Committee recommends that burros be hobbled, if practicable, in preference to picketing. Tying to trees at any time is undesirable; there are many examples of the roots of trees being laid bare from the restless pawing and walking around of animals so secured.

Recommendations to hobble or to turn burros loose might cause a certain amount of anguish among packers and the people who rent these animals; but if we are to halt current abuse and to forestall future abuse, these requirements may eventually prove necessary. In the meantime, we recommend a stepped-up program of education for burro users, especially for those who take an animal out for the first time. Experienced burro parties seldom picket their animals.

While the spot trip is accompanied by all the other undesirable human pressures, the pressure of grazing stock is absent. The spot trip is not suitable for those who wish to tour the back country, but it does appeal to many users who like to stay in a particular area, or who desire only a short trip. Another advantage from the standpoint of the visitor is that this type of trip is less expensive than a touring trip.

All in all, the Committee believes that the sum total of various adverse factors may stabilize livestock use at about current levels, but that backpacking will continue to increase.

Employees, both park and concessioner, comprise a minority of wilderness users, but present a number of administrative problems requiring the closer attention of management. As visitor use in the back country continues to increase, management will have to assign more personnel to supervise visitor use and to carry out increased maintenance responsibilities. These administrative activities will require that government and concessioner employees set an example of behavior that will tend to create favorable attitudes on the part of back-country visitors.

PROTECTING MOUNTAIN MEADOWS

The lush, flower-dotted meadows below timberline are the heartlands of the Sierra. These meadows, not the steep slopes or unbroken forests, are the liveable part of the mountains. From the standpoint of scenic beauty and camping comfort they are essential not only to travelers with pack animals but to the enjoyment of the wilderness experience by all other users of the back country.

The mountain meadows primarily considered in this report are the typical green meadows that are more or less surrounded by forest. The extensive alpine short-hair meadow type above timberline is equally important as a source of forage, but in general it is situated at the higher and relatively less hospitable altitudes which (with a few exceptions that can be fairly easily corrected) receive less concentrated grazing pressure than do the middle and lower altitudes. This alpine short-hair type has been damaged in certain other national parks and will be discussed separately.

Their Ecology

The mountain meadows of the Sierra, as described in this report, are located below timberline, at elevations above 6,000 feet, although most are found at altitudes above 7,500 feet. They are essentially basins, or irregular areas where drainage has been impeded. They contain accumulations of water-transported silt, sand, and gravel, and varying amounts of loam and organic matter. Although not always level, they are too wet to permit the growth of forest trees unless the water table is lowered significantly.

Under natural conditions the encroachment of forest trees on such meadows is slow. As an extreme example, the nearly level meadows in Giant Forest are completely surrounded by a dense wall of mature sequoias and white firs. The sequoias are a thousand years old, or more, yet the meadow has not been encroached on by trees.

The meadows of Giant Forest are in a state of such perfect equilibrium with respect to the water table that, so far as we can predict, they may exist there unchanged for another thousand years. When meadows are as saturated as these particular ones are, establishment of forest-tree seedlings appears to

be impossible. Maintenance of this equilibrium is further assured by the density of the grass-and-sedge stalks and their interlacing roots, which constitute a supplementary mechanical barrier to seedling establishment so long as the meadow sod is not heavily trampled and dried out by overgrazing.

The ecology of Sierra meadows situated above 6,500 feet displays basic differences from that of meadows at lower elevations. For example, the meadows in Yosemite Valley, at 4,000 feet, owe their origin and perpetuation to fire, and with the virtual elimination of fire are reverting to a climax forest (Gibbens, 1962). By contrast, Sharsmith (1959, p. 6), states, with respect to the higher meadows, "Roughly beyond an altitude of 7,500 feet, above which the majority lie and extend from thence to higher than treeline, any role played by fire in contributing to their origin rapidly diminishes in importance." The region studied by the Committee lies below 6,000 feet in only a few places, and most of it is above 7,000 feet.

"Although shifts in the point of balance [between forest and meadow] may sometimes occur under wholly natural conditions . . . observations still warrant the conclusion that [unless severely abused] back-country meadows are very stable generally, and . . . changes of any importance are only very slowly achieved." (Sharsmith, 1959, p. 19.)

Their Decline

Although all studies of high mountain meadows conducted during the last 20 years in the Sierra clearly indicate that these meadows are normally long-lived and ecologically stable, their history during the last 50 years, based on records, photographs, and on the annual rings of invading forest trees, reveals that these meadows went into a major decline throughout the Sierra a few years after the onset of the early period of intense grazing.

Much present stream channel cutting might not have occurred during any length of time in an undisturbed meadow where a healthy sod offers strong mechanical resistance which would slow down and keep erosion under control.

Throughout the Sierra, deterioration of high-country meadows has followed the same general pattern: It is initiated when overgrazing and trampling by excessive numbers of livestock break up the closely woven sod blanket and gradually kill much

of the grass-and-sedge cover. The underlying silt, sand, and gravel, deprived of this protection of the sod and vegetation, begin to erode. The original shallow drainage channels then become slowly deepening trenches.

Once started, this process tends to perpetuate itself. As the trenches deepen, the water table of the meadow continues to fall, still further reducing the ability of the moisture-requiring grass-and-sedge roots to survive continued overgrazing. They become replaced by plant species that are less palatable to livestock and more resistant to drought conditions. As the falling water table allows the soil to dry out still further, the meadow becomes an increasingly favorable seedbed for tree seedlings. Excessive numbers of livestock further promote seedling germination by trampling the seeds into the loose dry soil.

Thus, research findings disprove earlier contentions that drought cycles and floods may have been the major cause of deterioration. Injured meadow sod does show increased die-off during severe droughts; gully formation is accelerated during severe floods; and for meadows severely weakened by years of overgrazing, one or two dry years, or a severe flood, may indeed prove to be the last straw.

By contrast, healthy meadows merely produce a smaller volume of forage during a drought cycle, and their grass roots easily survive both drought and flood, for they have been adjusted to survive these hazards over thousands of years.

From this it can be seen that the sudden and rapid invasion of a high altitude meadow by considerable numbers of trees is a sign that a profound and usually permanent change has occurred in the meadow's ecologic balance. All evidence indicates that meadow sod cannot regain its original ascendance over the forest when the water table has been permanently lowered (Sharsmith, 1961, p. 114). Straggling remnants of grass may persist for many years, but ultimately the forest takes over completely--unless measures are taken to restore the water table.

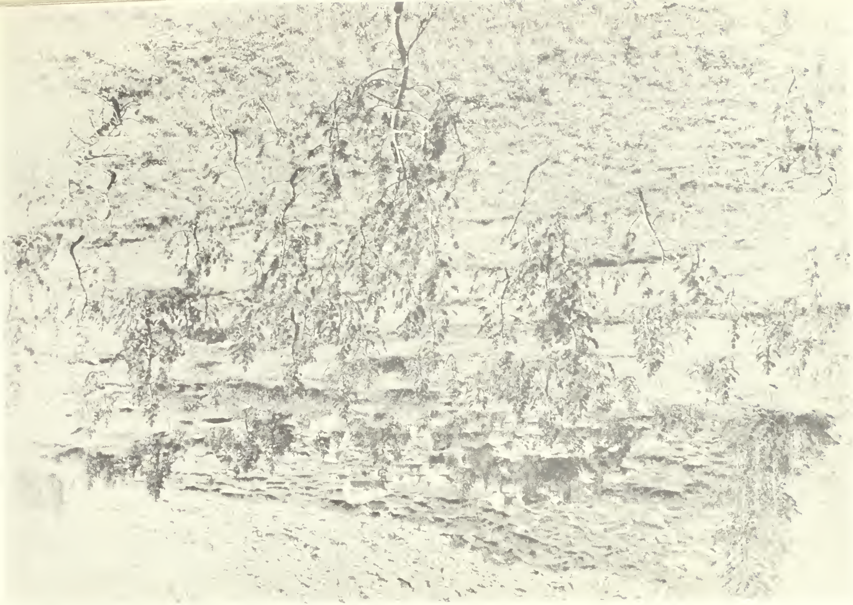


Fig. 6. Repeated ecological studies indicate conclusively that the large-scale invasions of small-sized, even-aged classes of lodgepole pines, so characteristic of heavily used High Sierra meadows today, are a result of man's overuse, and are not a natural phenomenon.

Their Rehabilitation

Healthy meadow sod possesses such a dense mat of interlacing rootlets that it stoutly resists breaking up even by a mattock or shovel. Therefore, to insure continued preservation of a meadow and all its components--the underlying soil, the water table, and the vital grasses--the saying would apply: "Save the surface and you save all."

Restricting grazing pressure to carrying capacity is a first step toward rehabilitation. Although many Sierra meadows have lost large amounts of soil and humus, stabilization at present levels and restoration of the grass still is possible. This has been demonstrated in meadows where grazing has been reduced or stopped entirely. Zumwalt Meadow on the floor of Kings Canyon near Cedar Grove, for example, was severely overgrazed for many years; now it is totally protected. Its recovery has been remarkable, in part because gully formation, which was leading to a marked drop in the water table, has been halted.

With the cessation of grazing, even the dusty canyon floor at Cedar Grove gradually has become noticeably greener and less bare compared with conditions observed there by Sumner in 1935. This area is at an elevation of only 4,600 feet; therefore, under continued protection from fire, it may follow the ecological pattern of Yosemite Valley and revert eventually to a climax forest. A similar process of recovery has commenced in certain other meadows of Sequoia and Kings Canyon National Parks, where grazing restrictions put into effect in 1958 already have brought about marked initial recovery. These meadows, and the rehabilitation methods used, have been described in the detailed area-management section of the Committee's original report. Overall rehabilitation measures, including the necessary administrative controls, are outlined in the present summary.

Clearing invading brush and trees from meadows when such invasions have resulted from unnatural conditions is another vital rehabilitation step. Removal of such trees is not only logical and ecologically justifiable but absolutely necessary for the restoration of overgrazed meadows as nearly as possible to their original unimpaired condition.

In recognition of this ecologically justified requirement for rehabilitation, the Director in 1950 authorized the removal of forest trees whose age classes prove, in conjunction with the known history of a particular meadow, that they became established during a period of severe overgrazing and primarily as a result of unnatural ecologic conditions caused by that overgrazing.

If the abnormal growth is removed and if grazing is reduced to the carrying capacity there will be little cause or need for tree-removal operations in succeeding years. With grazing reduced, research indicates that the meadow will again achieve a stable situation in its normal struggle against the forest.

Check dams and erosion gully plugs were constructed and maintained on a considerable scale for many years in Yosemite, Sequoia and Kings Canyon National Parks to stabilize certain meadows whose survival was jeopardized by manmade situations that could not be corrected immediately.

Most of these situations resulted from domestic livestock grazing permits, inherited by the Service, which subsequently have expired. Reduction or removal of this livestock has permitted nature to fully take over the healing program that these artificial structures had initiated. In their day these dams, plugs, and protecting fences saved many beautiful meadows from extinction. That their function is now nearly fulfilled is a measure of their success.

IRREVERSIBLE DETERIORATION

In Sequoia and Kings Canyon National Parks, Dr. Sharsmith's ecological appraisal of 1858 led to the conclusion, "Although no meadows seen have as yet gone beyond the limits of recovery, certain ones are closer to being in a critical condition and are more rapidly approaching that state than are others. The ones for which the amount of time for reaching a solution is the least are Lower (and probably also Middle) Meadow of Paradise Valley, Junction Meadow on Bubbs Creek, Junction Meadow on the Kern, First Charlotte Lake Meadow, and Timberline Lake Meadow. For these a solution needs to be sought immediately" (Sharsmith, 1959, p. 114).

A survey by Dr. Sharsmith of certain back-country meadows in Yosemite which were selected for study because of their known heavy use, showed comparable stages of severe deterioration. In a few areas, "one of the major changes which is being produced as a result of the damage is to all intents and purposes of an irreversible nature . . . All surface indications lead one to conclude that the deep sand of the neighborhood underlies the entire meadow. Lying directly upon and with apparently no

transition into this sand is a layer of loam which is deeper in some places, thinner or absent in others . . . the edaphic conditions are highly favorable in the loams with their high order of fertility and water-holding powers, and relatively unfavorable in the sand with its low order in these respects . . . wherever the loams are caused to disappear, the edaphic conditions become far less favorable, the change is irreversible, and there can be little hope of restoring the original ecology to the sites concerned.

"On one site . . . in 1941 the layer of loams was already shallow . . . The situation was then just about at the last point at which restoration of the original ecological conditions on the loams could have been assured. However, somewhere between 1941 and 1959, and probably within a short time, the loams disappeared altogether, and henceforth only loose and quickly drying-out sand, in which trampling has prevented even a hint of meadow recovery, has occupied its place." (Sharsmith, 1961, pp. 17-18).

DRIFT FENCES

A Management Tool

The primary purpose of a drift fence is as a tool with which to protect park resources from overuse by controlling livestock distribution. A drift fence sometimes may serve just as importantly to keep livestock out of an unsuitable grazing area where stock would cause damage, as it does to hold stock in an area that has been selected as suitable for livestock use.

A secondary purpose in drift fence construction may be convenience, but the convenience factor should be used as justification for a drift fence only insofar as this convenience can itself serve as a tool: for managing people so that they will take their stock to the suitable forage areas and avoid the unsuitable ones. As an example of such management through offering a convenience: People can be induced to give up using unsuitable, overgrazed areas at Vidette Meadow and Charlotte Lake by offering them suitable nearby areas which afford the security and convenience of drift fences that have been constructed for that management purpose.

Unfortunately, drift fences have at times fallen into disfavor because of the obvious damage to park values that has resulted when their location was determined primarily or solely from the standpoint of local convenience instead of in accordance with an overall back-country grazing and management plan.

Convenience alone should never be considered as justification for a drift fence, for at best a drift fence is a wilderness intrusion that serves only a minority of users; at worst the convenience factor encourages and aggravates existing conditions of range abuse and wilderness saturation.

Keep Installation Simple

Since drift fences do not enhance wilderness atmosphere, the simpler they are the less the impact of intrusion. The ever-present human tendency to bring conveniences over and above basic needs into the wilderness is revealed in some modern ranch-type back-country drift-fence gates made of sawed lumber and in some cases even of prefabricated aluminum.

The oldtime "wire gap" type drift-fence opening has been in use in the back country without hardship for some 40 years and certainly conveys more of a back-country flavor than does a factory-made aluminum gate. Pole bars are perhaps a little more convenient than the wire gap. They are a bit more "fancy"; but since they are an authentic part of the pioneer way of life, they seem more nearly compatible with wilderness atmosphere, and therefore are acceptable.

Fenced Pastures

Completely fenced stock pastures always are vulnerable to grazing abuse because of the difficulty of holding grazing pressure within carrying capacity in such small, confined areas. Pastures fenced for government use often can be justified by administrative necessity; their use is more easily defended because government usually feels a managerial responsibility for solving the overgrazing problems that such fencing creates.

Pastures fenced for use by visitors are much less defensible as a management tool. There can be little feeling of personal responsibility for management on the part of transient users. Likewise, administrative control of such users by the government is difficult, though possible up to a point. For

these reasons completely fenced visitor pastures usually have been severely overgrazed in the past, and have earned a bad name throughout the Sierra.

The Committee is opposed to small fenced visitor pastures, except under special circumstances where abuse constitutes no threat or where it can be effectively prevented. It is recommended that whenever possible, large grazing areas be made available through the use of drift fences in preference to small areas enclosed by complete fences.

SUPPLYING SUPPLEMENTAL FORAGE TO PACK AND SADDLE STOCK IN CRITICAL AREAS

Many strategic High Sierra meadows, offering only limited forage resources under the best conditions, are situated along established routes of travel that over the years have been badly damaged by pack and saddle horse grazing. The forage shortage problem in these cases is aggravated by the fact that there are no adequate substitute grazing areas nearby. Re-routing of travel to other areas is not always practical for relieving these strategic meadows, because of the extra miles that it would be necessary to ride, in these substitute areas, to obtain forage. In some cases such re-routing would be undesirable because of the bad consequences of bringing heavy grazing pressure into previously undisturbed areas.

If critical areas such as these are to continue to be open to the public traveling with stock, it will be necessary for supplemental forage to be packed in and fed to their animals. This will be the responsibility of each commercial packer or private stock party using such areas. Government work crews should be required to follow the same procedure.

DEVELOPED CAMPSITES

Developed campsites limit personal freedom of choice, and are a reminder of the shortages, restrictions, and artificialities that many people come to the wilderness to escape. The Committee is thoroughly sympathetic with this view. However, under present population pressures, developed campsites have

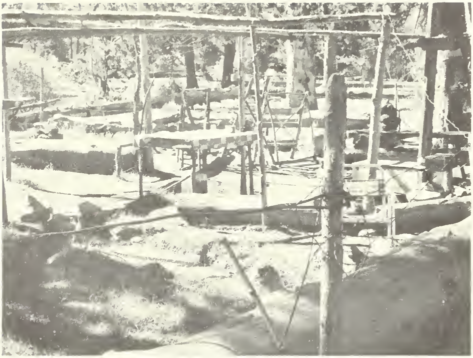


Fig. 7. Campsites developed by park visitors often take on the appearance of a slum, detracting from the natural scene, hastening the destruction of the area.

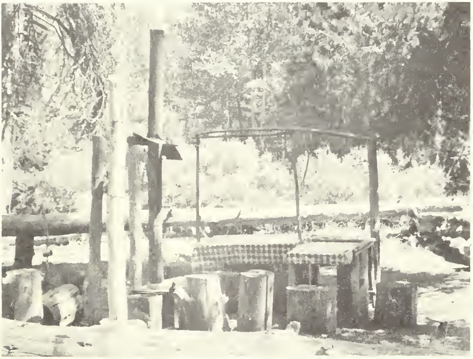


Fig. 8. After being dismantled by Park Rangers, the same site was partially rebuilt by visitors the following summer.

become absolutely necessary as a tool of management in the more popular and heavily used areas of the back country. The convenience of such campsites, backed up by regulations, is a means of persuading stock parties and others to camp where they will not damage the wilderness. The camp table and the camp stove are the major campsite components for attracting stock parties to use these specified sites.

Simple rustic facilities, properly located and spaced by the Service, will tend to hold camping within the carrying capacity of the area. This will prevent fragile meadows and lakeshores from becoming so ringed by innumerable unplanned, closely spaced campfire pits that they take on the appearance of a slum, with deterioration and eventual destruction of the natural scene. (Figs. 7, 8.) Developed campsites include provision for the periodic collection of camp refuse, which then is less likely to be carelessly scattered. They also curb the tendency to disturb the natural scene by rolling rocks in to serve as fireplaces and tables.

Campsite development by the visitor would not be permitted in areas containing Service-developed sites because this could nullify the many vital benefits resulting from the planned and developed campsite area. Additional camping areas which are needed during seasonal peakloads should be located in separate, designated overflow areas nearby. These overflow areas, because of their temporary use, would not need to be provided with all the facilities of the full-time use areas.

Rustic developed campsites, like drift fences, would not be looked upon primarily as a convenience for the visitor, but rather as a management tool to assist in controlling indiscriminate camping in areas where it has proven destructive to wilderness values.

In addition to the simple table and stove, a hitch rack should be installed some distance away from each campsite. This will reduce damage to young trees and other vegetation by the tied-up stock, and will improve sanitary conditions near the campsite. The installation of pit toilets is also recommended where numerous campsites are located in the same general vicinity.

The following practices should be followed in campsite development in the back country of the Sierra to preserve remaining wilderness features:

1. The minimum distance between individual camps in designated campsite areas should be 600 feet. The purpose of this limitation is to get away from the unplanned high country "slum" conditions of the past, and to provide the privacy, and relief from congestion, which are essential to wilderness atmosphere. The Committee arrived at this minimum distance figure during its on-the-ground study of screening vegetation available in the rather open alpine country where the first designated campsites need to be established in Sequoia and Kings Canyon National Parks. This compares closely with Snyder's specification of, "at least 1/10th of a mile apart for a reasonable degree of privacy and quiet," for the High Sierra Wilderness Area (Snyder, 1960, p. 21).

2. Pole hitch racks for stock should be located no closer than 100 feet from any table and stove unit.

3. Camp tables should be built of native materials if available. If such materials are not available, a rustic prefabricated type should be provided.

4. Camp stoves should be constructed of native rock and mortar, with steel grills, in areas where ample firewood is available. Camp stoves of native rock built by visitors during past years, if properly located and appropriately constructed, may be retained.

Where there is an acute shortage of firewood, as in the vicinity of the Upper Rae Lake, prefabricated stoves are recommended. Such stoves should provide the camper with warmth as well as heat for cooking, with a minimum amount of fuel. (See Fig. 9; also, description of stove made from a 30-gallon drum in January-February 1961, Grist.)

Greater use of gasoline stoves by stock parties for cooking should be encouraged.

5. Pit toilets of a type appropriate to the surroundings should be provided for every five campsites in congested camping areas.

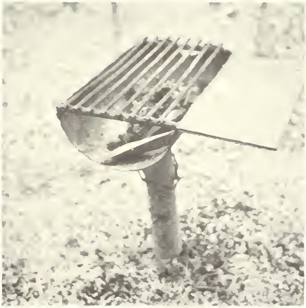


Fig. 9. Where there is an acute shortage of firewood, prefabricated stoves are recommended. These can be made from half of a 15 or 30-gallon drum.

6. Shelves, cupboards, coolers, and similar artificial camping refinements of a permanent nature that have been constructed in the past by visitors should not be allowed in these campsites. Those of a temporary nature that can be lashed or hung from trees without damage to the vegetation may be permitted but should be removed and disposed of by each camper when he leaves the area.

7. Overflow camp areas should be provided in conjunction with all developed camping areas. These may be left largely undeveloped since they are considered to be supplementary to the regular designated areas and open to use only after the latter have been filled up, which normally would occur only for occasional periods of peak visitation.

8. Garbage pits are not recommended at this time. In addition to being an unsightly and odoriferous intrusion they invite serious bear trouble. The thin, rocky soil of the Sierra back country offers few opportunities for digging pits deep enough to accommodate the present volume of cans and other garbage. Already, most long-established high-country campsites are surrounded by little shallow pits containing the insufficiently buried and continually emerging tin cans and bottles of previous campers.

Garbage pits are not only ineffective under these conditions, they shift the emphasis from personal responsibility for carrying out one's personal belongings, and good wilderness manners generally, to the psychology of a city dump.

BASE CAMPS, LARGE PARTY USE, ESTABLISHED CONCESSIONER CAMPS

Establishment of base camps with large numbers of attendant stock should not be permitted along, or immediately adjacent to, heavily used trails. Careful selection of sites for such base camps should be made; and, if ample forage is not available, feeding of hay or food concentrates should be required.

Use of over 35 head of stock by a party, regardless of size, should be discouraged; eventually such use may have to be prohibited. Large-group excursions became a tradition with various organizations in earlier times, when back-country use was light and present-day forage problems did not exist.

The Committee comprehends and is in sympathy with the conservation point of view of large outing organizations, such as the Sierra Club, which contends that its pack and saddle stock ratio of 1 animal to 3 persons represents the minimum stock requirement of any group. We also appreciate the validity of the assertion that the individual financial savings made possible by 80 or more people pooling their resources for a single outing, help to spread an appreciation of wilderness, and enlist conservation support, among an important segment of the population that is insufficiently experienced, able-bodied or wealthy to make individual trail-trip arrangements. Group proponents also remind us that 80 persons would have a greater overall impact on the wilderness if they were forced to bring in their own supplies and livestock individually, with resulting duplication of facilities, services and consumptive uses.

In effect, restrictions on large but responsible outing groups tend to disproportionately penalize some of the very people who over the years have been most active and conscientious in exploring and protecting wilderness. However, the very efforts of these groups over the past 40 years to encourage greater public interest in and use of the Sierra have been so successful that today all users of the remaining Sierra wilderness must face the not fully anticipated ecological consequences of this increased use.

Arthur H. Carhart (1961, pp. 71-72) raises this question of the effects of large groups on wilderness atmosphere and ecology, in his handbook on wild land management, but he does not attempt to present a final answer. The present Committee, also, recognizes that in areas where the traditionally large groups now present a hazard to wilderness ecology new adjustments must be made to fit today's new conditions.

The provision, previously mentioned, that large groups shall camp in specially designated areas, usually off the main trails, is one of the necessary adjustments to the changing times. This adjustment has been put increasingly into effect in recent years, either voluntarily or in cooperation with management.

It is hoped ecological damage can be sufficiently controlled so that large groups need not be discouraged by a multiplication of restrictions. However, if such groups are to continue to be permitted in areas where a serious forage problem would be severely aggravated by their presence, they should be required to pack in the feed for their stock, and be subject to such other controls as may be required to prevent irreversible ecological damage to the areas.

It is strongly recommended that a chain of High Sierra Camps such as the one at Yosemite should not be introduced into Sequoia and Kings Canyon National Parks. Such camps, where extensive equipment, supplies, facilities, comforts and conveniences of civilization are maintained to serve large numbers of unequipped people, can change a true wilderness into another "front country" area. In Sequoia and Kings Canyon National Parks, which currently experience a saturation in back-country use, even without these conveniences, such camps would intensify and still further complicate current overuse problems by attracting still another category of user.

NEW TRAIL CONSTRUCTION

Construction of a new trail into a previously undisturbed wilderness area must be subject to a careful consideration and appraisal of resulting public use, ecological impact, and preservation of wilderness values for the future.

A careful analysis must be made of such areas to adequately determine their natural values; the degree of visitor use these values can receive without irreversible impairment; and the long-range effects on wilderness preservation of making such areas more accessible to the public than they already are.

New trail construction in an unmodified wilderness should not be considered a solution for relieving visitor congestion in an already modified wilderness, no matter how attractive it may initially appear. This measure, as a remedy for congestion in one area, too often serves only to spread it to another.

TRAIL MANAGEMENT

Management of the back-country trail system in these parks plays a very important role in the preservation and protection plans for wilderness areas. Close cooperation is essential between personnel in the various divisions of the park organization that have responsibilities for protection activities, trail location, trail construction, and trail maintenance. The fact that one division is responsible for trail maintenance should not deter personnel of another division from removing obstacles or hazards whenever they are encountered on the trails. To detour around an obstacle, instead of promptly removing it, often creates a new trail, which can prove detrimental to preservation objectives.

Trail maintenance and the related planning activities necessary to accomplish this work must be closely coordinated with protection and visitor-service activities if park values and an adequate standard of service to visitors are to be maintained. Unless this coordination is achieved, trail maintenance and construction can become an end in itself and be carried out in some areas without due regard for the preservation of fragile values, or the attainment of visitor-service objectives. Snyder (1960, pp. 27, 55) states that in the High Sierra District of the High Sierra Wilderness Area, administered by the U. S. Forest Service, trails at lower elevations should be brought up to standards required by stock; then, beyond the point of maintenance for stock, they should be reserved for the hiker and posted, "Hazardous Trail for Stock Travel."

By virtue of basic training received in ecology and in the wilderness-protection principles of the Service, the Park Ranger logically is one of the persons in the best position to know which areas in his district might suffer drastic ecological alteration by unsupervised trail maintenance or by new trail construction. His responsibilities also require him to be currently informed as to visitor use of park trails, and as to the places where trail work is needed to assure safe conditions.

For these reasons, the Committee suggests that in Sequoia and Kings Canyon National Parks consideration be given to assigning the responsibility for planning and supervising the trail maintenance program to the Division of Ranger Activities.

TRAIL MAINTENANCE

Primary trails are the routes that receive intensive visitor use, such as the John Muir and Bubbs Creek trails. These trails must be maintained in a safe, but not a roadlike condition.

Secondary trails are the routes that receive little visitor use, such as Woods Lake and Soda Canyon. These trails can be kept passable, but should not be improved, lest they invite use beyond the existing carrying capacity of the areas they serve.

Undesignated trails should be left alone, for these are the true wilderness routes, and to improve them or call attention to them would bring to new areas all the ills of overuse that now plague the heavy use areas.

RE-ROUTING OF TRAILS

Trails that cut across meadows often hasten the eventual destruction of the meadows by causing erosion, compaction, and other less obvious but related ecological damage. All investigators in the Sierra, and in the National Parks of other mountain areas, have arrived at the same conclusion, that the removal of trails from meadows is of prime importance if the meadows are to be left unimpaired for the enjoyment of future generations.

TRAIL BRIDGES

Trail bridges which are large and sturdy enough to accommodate parties with livestock can be a real liability to mountain wilderness areas where grazing and trampling already is a serious problem. These large bridges, by making high-water crossings easy, encourage stock parties to enter the high country too early in the season and to use the higher mountain meadows while the latter are still too wet and subject to an unacceptable degree of damage by trampling.

For more effective control of the use of livestock in the back country too early in the season, it is strongly recommended that fords be used in lieu of large bridges where this does not constitute a physical hazard to park visitors during the season of appropriate back-country use.

Backpackers, whose early arrival in the high country does not damage the meadows, are accustomed to searching for natural fallen logs on which to cross streams; consequently, they are not so dependent on trail bridges. For them, artificially constructed footbridges are more a convenience than a necessity.

Public safety and wilderness values are the primary factors that must be taken into consideration before constructing a trail bridge in the back country. Public convenience is here, as with drift fences, not in itself sufficient justification and, because of the detriment to wilderness values, should not be considered a valid reason for bridge construction in a wilderness area.

In many cases a constructed ford, or a sign directing attention to a natural (or artificial) fallen log, will adequately meet the requirements of the back-country visitor.

BACK-COUNTRY TRAIL SIGNS

When properly worded and located, signs have obvious value for the back-country visitor. Signs also can be used to protect the wilderness by indirectly regulating the degree of visitor use of a given area.

A well-conceived system of trail signs should seek to avoid the arbitrary setting up of destination points through overemphasis of site names or mileages to popular campsites that already have serious camping and grazing problems.

Some signs can be actually detrimental if made too conspicuous and if placed where they will call the attention of all passers-by to areas off the "beaten track" that would suffer severely from increased visitor use.

BACK-COUNTRY CLEANUP

The National Park Service has a definite responsibility for a back-country cleanup program that will effectively preserve the wilderness atmosphere.

Education of the back-country user, no matter how effective it may become eventually, must be supplemented by actually assigning park cleanup crews to areas that receive intensive visitor use.

Garbage or tin can pits should not be constructed at any campsite, for these destroy all feelings of responsibility and incentive on the part of packers and visitors to carry out the cans they have brought in.

ACTIVITIES OF GOVERNMENT AND CONCESSIONER EMPLOYEES WHILE WORKING AND LIVING IN THE BACK COUNTRY

The public respects the park rangers, naturalists, members of the trail crews, and packers. All government and concessioner employees should set a good example of back-country conduct to uphold this respect. If these employees practice poor 'housekeeping'' at their back-country camps, display a lack of personal cleanliness, unduly disturb the wilderness environment, feed bears and deer, or commit other infractions of the rules and regulations, our efforts to encourage the public to use good back-country manners and practices will be increasingly difficult.

It is the responsibility of all supervisory personnel and pack-station operators to see that each of their employees is aware of his responsibility to offer to the public a good example of personal conduct and behavior, and respect for regulations

CHAIN SAWS - A THREAT TO WILDERNESS

The chain saw gradually is becoming part of the more luxurious type of modern camping equipment, though not for the majority of wilderness users who visit back-country areas without pack and saddle stock.

Although the chain saw is primarily used by visitors to obtain firewood, it is frequently employed to provide miscellaneous supplementary camp comforts. Indiscriminate use of chain saws by the public, and by unsupervised government crews, can prove catastrophic to the aesthetic features of an alpine landscape, by gradually eliminating all of the magnificent dead standing trees which are a highly picturesque feature of the wilderness.

The roar of a saw is particularly distasteful in a remote wilderness area to which people come to get away from mechanized noises. The use of a chain saw in back-country areas should be permitted for administrative use only and only upon the prior approval of the Park Superintendent. All saws thus used should be equipped with a muffler.

USE OF AIRCRAFT, INCLUDING HELICOPTERS, AS A MEANS OF REDUCING DAMAGE TO PARK VALUES

The first of our National Parks was established before either the automobile or the airplane had come into existence. Although the automobile is now the dominant form of mechanized travel, it has not been permitted to extend into large areas of wilderness. Like the automobile, the airplane, though it came along later, is now generally accepted as a dependable and safe means of transportation.

A MISSION 66 Reappraisal Statement on Aviation, April 5, 1961, states, ". . . the obligations of the Service would appear to be to make full provision for the essential use of aircraft in and over the National Park System while continuing to reserve the existing large areas of roadless wilderness for those ever-increasing numbers of visitors, which there is every reason to believe will continue to come to the National Parks to enjoy the remaining rare primitive areas of our country that are kept free of automobiles, motorboats and the landing of aircraft."

The MISSION 66 Statement continues: "We recommend no essential change from the current aircraft policy and supporting regulations which prohibit landings in other than designated areas, except by aircraft engaged on official business for the Federal Government . . . Aside from the continuing need to control aircraft landings and to prohibit such landings in wilderness areas except where officially designated, the most critical factor in the establishment of a positive aircraft use policy, and controls for its implementation, stems directly from noise.

"People visit parks in part at least, for rest, relaxation and freedom from mechanized civilization . . . Controls are effective in reducing excessive noise of surface motor vehicles but this has not yet been accomplished for aircraft . . . An aircraft that made no noise and did not land would provoke few protests.

"Helicopters are very noisy . . . Until helicopter operation becomes less noisy, low-elevation flights via this means continue to be objectionable. Therefore it is felt that at the present stage of helicopter development, the designation of heliports in or immediately adjacent to developed areas is undesirable, and helicopter landings in the parks should continue to be restricted to administrative use."

The above statements, and their implications, as to the potentialities, disadvantages and restrictions of aircraft, and particularly of helicopters, provide a frame of reference for the Committee's observations and recommendations on this subject.

Management activities performed by government crews in the back country of Sequoia and Kings Canyon National Parks always have included the use of pack and saddle stock in considerable numbers. Increasing public use of the back country has made it necessary to step up these management activities to meet the requirements of preservation and of public safety. In most cases this has required an increase in personnel which, in turn, has resulted in an increase in the numbers of stock needed for transportation and supply of rangers and maintenance crews. This stock use is still flavored to some degree by early day practices which did comparatively little damage when these natural areas were less heavily used than they are today.

In view of the proven damage to Sierra meadows by excessive numbers of stock, the use of aircraft appears warranted in cases where it will significantly reduce severe damage to mountain meadows, as in the case of airplane drops of government supplies in lieu of using pack strings for this purpose.

The varied types of work that the helicopter is capable of performing, its maneuverability, new high-altitude operational capabilities, and safety features--all of which are being constantly improved--have rapidly pushed this machine to the fore in the minds of management personnel, both business and government. However, it is recognized that until the noise factor can be significantly lowered, use of the helicopter in the back country will have to be justified primarily on the basis of emergency conditions, or of unusually severe damage to natural values by stock, if transportation by stock clearly is the only other alternative available.

If it is essential that stock be used to carry out the management responsibilities in certain back-country areas where the use of this stock may place an additional burden on meadows already heavily grazed by public stock, it is recommended that hay be air-dropped in these areas for the government stock.

The transportation and supply of government crews must be accomplished in ways that will not be objectionable to the park visitor, or cause serious impairment of historic, natural, recreational, or wilderness values.

RANGER STATIONS AND PATROL CABINS IN THE BACK COUNTRY

The policy of the National Park Service has been to keep development, including permanent structures such as Ranger Stations, at a minimum consistent with the practical requirements of protection for the areas which it administers. This applies particularly to the back-country areas.

The construction of only the necessary minimum Ranger Stations or patrol cabins far back from the roads has been a part of park protection policy for many years. This policy is consistent with recognition that wilderness atmosphere, as defined in this report, retreats from the invading permanent dwellings.

Changing times have simplified many travel and supply problems; they have placed an ever higher value on remaining fragments of uninhabited wilderness; and they have brought mounting concern lest these fragments be invaded by artificial or nonessential attractions, conveniences, and structures. Changing times require no change of long-established policy but only a continued and farsighted application of it.

Back in the days when all was wilderness, a permanent habitation far from road's end seemed a small and inconsequential intrusion. In regions of the north, back-country ranger stations and patrol cabins had real survival value in winter. Today, in the Sierra, roads have come close; back-country radio brings daylong contact with the outside world; aircraft are more and more on routine patrol and can drop supplies if necessary; helicopters can be summoned for the real emergencies; wilderness travel in winter is approaching zero as even snow-measuring patrols become airborne. Now that the back country lies only a few hours from road's end by normal surface travel, and less than one hour, in emergency, by helicopter, back-country residential requirements are less exacting than in the past, particularly when limited to summer operations.

The light summer precipitation, mild climate, and short work season of the High Sierra renders elaborate permanent residences much less necessary than in some other wilderness parks. As indicated elsewhere in this report, tent-frame back-country patrol stations on suitable foundations are entirely practical, as well as appropriate, for certain strategic areas, if adequate and substantial winter storage facilities also are provided.

If and when cabins must be constructed, they should be unpretentious, and unobtrusively located. In areas where there is an absence of native materials, or where log construction would draw too heavily upon the very sparse timber resources of the high country, it will be necessary to consider prefabricated materials of wood or metal. Facilities constructed of these materials should be painted a color that harmonizes with the natural scene.

The area management and workload responsibilities, the period of occupancy, whether short-term or long-term, and the variations in climatic conditions will determine the type of facility needed.

REGISTRATION, USE OF A CAMPING PERMIT

At the present time Sequoia and Kings Canyon National Parks do not require a campfire permit for the back country. However, it is recommended that, for several reasons, such permits be required: Many visitors are confused that campfire permits are required on similar adjacent U. S. Forest Service land and in other California National Parks, but not here. It was formerly argued that the issuance of such permits would be impractical because of an absence of contact stations for the many passes leading into this area from the east side. But when the seasonal and permanent ranger staff of the Sierra Ranger District is increased as recommended in this report, this argument will no longer hold.

Visitors can be advised by signs at the pack stations and at the east side passes that they can obtain campfire permits from a Park Ranger after entering the park. The permit can be designated as a camping and campfire permit, and it is recommended that instructions on the back include regulations regarding required camping practices. A carbon copy of each permit would be retained by the issuing officer.

In addition to its usefulness in fire prevention and in supplying information on camping rules and back-country practices, such a permit would furnish a better record of back-country travel than is currently available. Visitors could be more easily located if overdue, or if it were necessary to deliver emergency messages to them. Space would be available on the face of the permit for the visitor to include information as to his intended length of stay and route of travel.

ROLE OF INTERPRETATION IN THE BACK COUNTRY

Interpretation can be an effective tool of management for wilderness areas. Interpretation of what the visitor sees, or is about to see, leads to a better understanding and greater enjoyment of wilderness values. Interpretation also can create an awareness of his responsibility and a desire to assist in protecting these resources. Now that wilderness is becoming so scarce, and so crowded, the interpreter should place increasing emphasis upon the objectives of the National Park Service when presenting talks on wilderness resources, and should refrain

from overemphasizing the attractions of certain areas that are receiving severe overuse. This will require close coordination between the Divisions of Natural History and Ranger Services, whose personnel, by the nature of their responsibilities, are most familiar with the wilderness areas that are suffering from overuse.

Trail and back-country guidebooks should be used to promote greater enjoyment and appreciation of these areas, and to instill in the visitor an understanding of good back-country manners and a desire to aid in preservation. Trailhead exhibits can point out specific ways in which the visitor should participate, to his own benefit, in proper use and conservation of wilderness values. Such orientation exhibits should be provided at all major trail entrances. On the east side of the Sierra, where it is not feasible to erect such exhibits within or at the Park boundary, due to the ruggedness of the terrain, permission should be obtained from the U. S. Forest Service for placement of exhibits at appropriate locations on Forest-supervised lands.

Visitor-center or museum exhibits should also be used to tell, without overemphasis, the facts concerning the wilderness, its resources, and the preservation practices that should be followed while there.

GENERAL PUBLICITY

General publicity on wilderness areas of the Sierra continues in the pattern of an earlier day when wilderness was unsaturated. The goal then was to encourage as many people as possible to get acquainted with this magnificent region, so as to put it to its highest use and to secure support for its permanent establishment and preservation. Publicity has achieved its initial goal so successfully that saturation, rather than nonuse, is the current danger, while management and protection struggle desperately to catch up.

If this trend continues, it can hasten the eventual destruction of major back-country values. Already we think of the John Muir Trail from Yosemite through Sequoia and Kings Canyon National Parks as a "freeway" in the general trail system of these parks and intervening National Forests.

The biological productivity of most small High Sierra streams has severe natural limitations which prevent the continuation on a mass basis of the excellent fishing that was available to the comparatively few wilderness users of 30 years ago. Yet too often the back-country fishing opportunities are glowingly described as though they still existed unchanged in the same areas today.

Pack outfits, whose survival depends upon the number of visitors that they pack into the area, naturally try to attract more and more people to their facilities. However, our Service need not feel under pressure to duplicate such efforts. Newspapers and magazines have been responsible for concentrating use past the saturation point on certain areas eulogized in their articles. Such articles no longer need be actively encouraged by our Service.

Visitor use will increase with the population growth of California--without further encouragement from articles eulogizing particular scenic wilderness areas. It is a question not of "locking people out" but of refraining from further artificial stimulation that in the long run could disappoint all users.

On the other hand, publicity concerning the preservation and management of National Park wilderness areas should be given every encouragement as an important aid in attaining the primary objectives of the Service and of visitors as well.

MANIPULATION OF FISHING ACTIVITY AS A MANAGEMENT TOOL

(Prepared by the Committee in collaboration with
O. L. Wallis, Aquatic Biologist,
National Park Service, Washington, D. C.)

Fishing is a powerful magnet attracting many anglers to the back country. Selective stocking of trout populations can be used as a control measure to reduce the impact on fragile wilderness environment. By increasing or diminishing the attractiveness of back-country areas for this group of users, it will tend to disperse the large fishing parties using livestock.

In some lakes that are otherwise biologically suitable for trout, opportunities for spawning are limited or absent; therefore their trout populations can be maintained only by periodic stocking. In the absence of planting, such lakes either become barren when current stocks of trout die out, or the numbers of wild trout, produced by limited natural reproduction, are so small that fishing becomes discouraging and unattractive to many anglers. If visitor pressure causes severe problems at this type of lake, a suspension of stocking can reduce or eliminate some of the visitor impact.

At the same time, anglers may be lured away from severely overused areas by stocking trout in less intensively used areas; but care should be taken that this transfer of angler use does not result in damage to, or conflict with, other park resources and users. Fish stocking should not be used to open up extensive new territories that previously had been passed up by anglers. Rather, it should be used to decentralize the visitation in already accessible areas that are suffering from overconcentration.

Waters in the Sierra National Parks that are now barren usually should not be restocked. Practically no park waters have failed to receive introductions of trout at some time. Those now barren are in this condition because conditions are largely unsuitable for trout, and because their isolated location did not warrant continued restocking, in the face of generally unfavorable conditions.

Control of angler use by regulating stocking operations is more difficult, and sometimes is impossible, in high-country lakes and streams where populations of trout are established and self-maintained by natural reproduction. In any case, additional stocking in these waters is unnecessary, and can prove detrimental by creating so much competition for food that growth of all the fish is stunted.

Where exceptional damage by visitor use occurs at some of these self-maintaining trout waters, it may be necessary to discourage some camping by closing the lakes to fishing until the damage has been controlled. It has been suggested that in certain areas a rotation system of closing and opening various waters to fishing may relieve heavy visitation and livestock pressures. This management method has possibilities, but it may be necessary to guard against increased pressures upon a lake which is opened after a period of closure. Otherwise the stampede to the newly opened lake can be so severe that the expected benefits will be offset.

A carefully planned, long-range stocking program should be developed for the back-country lakes. This plan, based on adequate biological investigations, should consider the desirability of stocking not simply with regard to spawning possibilities, but more importantly in connection with present and anticipated angler use in relation to the pressure that the area can withstand. The frequency of stocking, and the species of trout to use in each lake, should be incorporated into this fishery resources management plan. Additional principles which should be included in the development of such a plan include the following:

1. Lakes should be stocked only up to their capacity; high-altitude lakes can easily be overstocked with trout. Such overpopulations result in small, stunted fish that are unattractive to anglers and therefore not fully utilized. This defeats the objective of planting to regulate back-country use. Recovery from the effects of overstocking in lakes where no spawning occurs requires three to five years at least. In lakes where natural spawning occurs, the damage done by overstocking can last for decades.

2. In lakes which contain no natural reproduction, five to seven years represents the maximum effective survival of a planting of rainbow or golden trout. Therefore, planting of most back-country lakes should be done at intervals of about 5 years. Such a cycle provides better survival of the planted trout because competition among the various age groups in a given lake is eliminated.

3. Lakes in close proximity to one another should receive staggered stocking so that all of the lakes will not be planted in a single season. This will spread the fishing pressure from year to year over various lakes in the vicinity because all will not reach their "peak" at the same time.

4. Certain lakes in the Sierra should be reserved for the unique golden trout, which is the glamour fish of the High Sierra. Restocking of this fish in suitable waters can be used to draw anglers from more heavily used areas.

On the other hand, the stocking of rainbow trout in golden trout lakes, or in waters which flow into such lakes, will result in the hybridization of the rainbow with the golden trout. This will bring about the eventual disappearance of golden trout characteristics in trout of the lakes below, and in other waters further downstream, or in upstream waters if access is not obstructed by waterfalls and other barriers. (in conformance with existing National Park Service policy, golden trout should not be stocked in waters that do not already contain this species.)

5. Rainbow or golden trout should be the only species used for stocking back-country waters of the Sierra National Parks, because these species are native to the region, and are more manageable than non-natives such as the brook trout. Brook trout are widely established; but further stocking of brook trout will not improve fishing--on the contrary, it will increase the danger of spreading brook trout into waters now occupied by rainbow or golden trout.

Brook trout tend to develop overpopulations of stunted fish. Under such conditions, the brook trout will force out the other species. Neither cutthroat nor the aggressive brown trout would be suitable species for these waters.

6. Streams in the back country should not be stocked. In back-country streams suitable for trout, wild populations are being maintained by natural reproduction, and this natural spawning is producing as many fish as the streams can handle.

In some of these streams overproduction of small and stunted fish has resulted from overefficient natural reproduction, even without artificial stocking. Stocking of additional fish in such streams is not only unnecessary, it can be detrimental. In competition with the wild fish, the stocked fish have poor chances of survival. Research has demonstrated that stocking of streams under conditions prevailing today does not increase the catch for fishermen.

PROTECTING ALPINE COUNTRY

As indicated under PROTECTING MOUNTAIN MEADOWS, p. 16, the Committee had to give much more attention to the severe recreational and grazing overuse problems of the middle-altitude wet meadows ("montane" ecological type), than to the lighter grazing problems of the drier, and more spacious, high-altitude shorthair types above timberline ("subalpine" and "alpine" ecological types).

This was in large measure because recreational use of horses, mules, and burros has continued to maintain its pressure in the National Parks of the Sierra despite its decline in other National Parks. Grazing use of Sequoia and Kings Canyon National Parks, at 38,205 horse days, exceeds grazing use in all other units of the National Park System. Yosemite National Park is next in importance in this respect, with 28,358 horse days (National Park Service, 1961).

As the present report shows, various other types of overuse are common to nearly all altitudes in these Parks, therefore, the Committee's treatment of general and specific problems of overuse has not been limited to particular altitudes except in the case of overused meadows. Damage to subalpine and alpine meadows and tundra by hikers occurs to some extent in the Sierra, but appears to be more conspicuous in certain National Parks of other mountain systems.

At Mt. Rainier National Park, subalpine meadows have been extensively trampled and eroded by the feet of visitors, and in some places by the horses of trail riders as well. However, two seasons of ecological research demonstrate great tenacity and recuperative powers in the alpine vegetation. Although deterioration has been accelerating in recent years, recovery is considered still possible provided corrective steps are initiated promptly by management. These include planning of trail routes and other necessary physical developments with the ecological requirements of the respective use areas in mind. Measures to increase public awareness and sense of personal responsibility in the use of trails are also recommended.

Significantly, an accelerated replacement of subalpine meadow by Alpine Fir (Abies lasiocarpa) appears to have resulted from heavy public use at Mt. Rainier in much the same manner that lodgepole pine has invaded the overused meadows of the Sierra (Brockman, 1959, 1960).

At Rocky Mountain National Park, the initial two years of a long-range research project have revealed drastic alteration, and even obliteration, of tundra environments adjacent to parking areas and heavily used foot trails (Marr and Willard, 1959, 1960).

At Grand Teton, damage by livestock is added to that of hikers. In the Lake Solitude and North Cascade Canyon areas of that Park, many situations of overuse are similar to those described for the California Sierra, and have received comparable recommendations for correction: Meadows are crossed by parallel trails that should be re-routed around the meadows; horses are brought into the high country too soon in years with a late wet spring; use of campfire wood is in excess of natural production; living trees are cut for tentpoles by horse parties that haul in large tents (this is a comparatively uncommon offense in Sequoia and Kings Canyon National Parks); accumulation of litter requires an accelerated cleanup program (Bendt, 1961).

In general, the steps that must be taken by management to eliminate damage to subalpine and tundra environments add up to inducing users to stay on properly located and constructed trails, and in certain cases prohibiting livestock on the trails in spring until the ground has sufficiently dried out. Seven such steps are:

1. Planning of trail systems so as to eliminate insofar as possible, the temptation to make shortcuts and parallel trails.

2. Closing of all horse trails across meadows and re-routing of such trails to skirt around the meadows.

3. Closing certain trails to livestock in spring until the ground has dried out enough to minimize damage.

4. Permanently closing certain especially fragile areas, beyond a designated point, to livestock.

5. Location of trails to avoid, whenever possible, wet places, late spring snowbanks, and other barriers that force people to make detours from the designated trail.

6. More effective programs to develop in visitors greater appreciation of and sense of personal responsibility for their environment.

7. Placing, at prohibited shortcuts and detours, of warning signs and temporary barriers; and scattering of large boulders along detour trail surfaces.

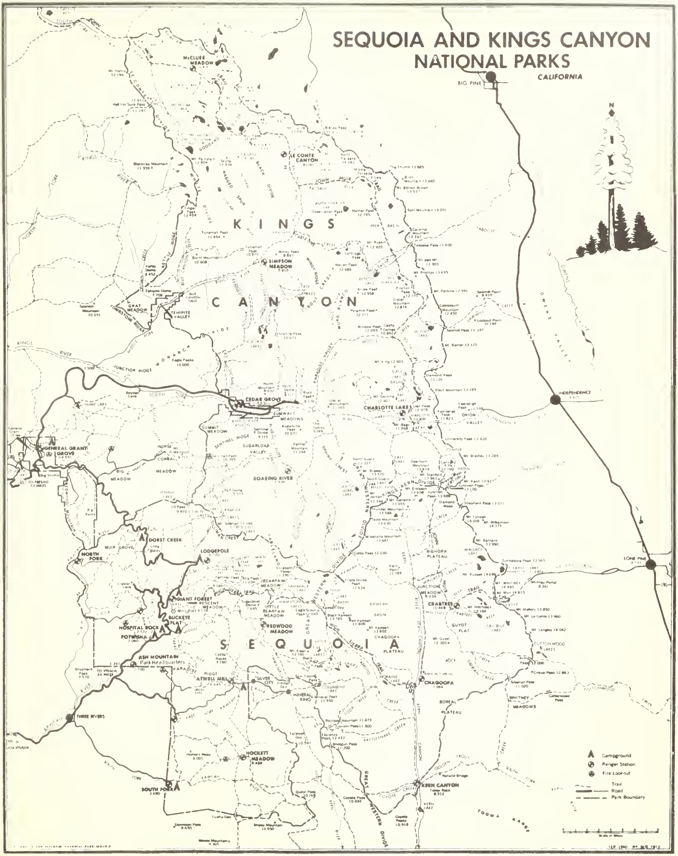

SEQUOIA AND KINGS CANYON
NATIONAL PARKS
CALIFORNIA
N
BIG PINE
INDEPENDENCE
LONE PINE
OWENS VALLEY
KINGS
CANYON
SEQUOIA
McCLURE MEADOW
LE CONTE CANYON
JOHN MUIR TRAIL
SIMPSON MEADOW
TEHIPITE VALLEY
GRAY MEADOW
TOMBSTONE RIDGE
MONARCH DIVIDE
JUNCTION RIDGE
KINGS RIVER
CEDAR GROVE
ZUMWALT MEADOWS
CHARLOTTE LAKES
ORION VALLEY
SUMMIT MEADOW
SENTINEL RIDGE
SUGARLOAF VALLEY
ROARING RIVER
GENERAL GRANT GROVE
TO FRESNO 52 MILES
BIG MEADOW
KINGS KERN DIVIDE
GREAT WESTERN DIVIDE
DORST CREEK
MUIR GROVE
NORTH FORK
LODGEPOLE
BIGHORN PLATEAU
WALLACE LAKE
GIANT FOREST
CRESCENT MEADOW
BEARPAW MEADOW
JUNCTION MEADOW
CRABTREE
HOSPITAL ROCK
BUCKEYE FLAT
POTWISHA
REDWOOD MEADOW
HIGH SIERRA TRAIL
CHAGOOPA PLATEAU
GUYOT FLAT
COTTONWOOD LAKES
ASH MOUNTAIN
Park Headquarters
TO VISALIA 34 MILES
ATWELL MILL
SILVER CITY
MINERAL KING
CHAGOOPA
BOREAL PLATEAU
WHITNEY MEADOWS
THREE RIVERS
HOCKETT MEADOW
SOUTH FORK
KERN CANYON
KERN LAKE
TOOWA RANGE
GREAT WESTERN DIVIDE
Campground
Ranger Station
Fire Lookout
Trail
Road
Park Boundary
Scale in Miles

Fig. 10.

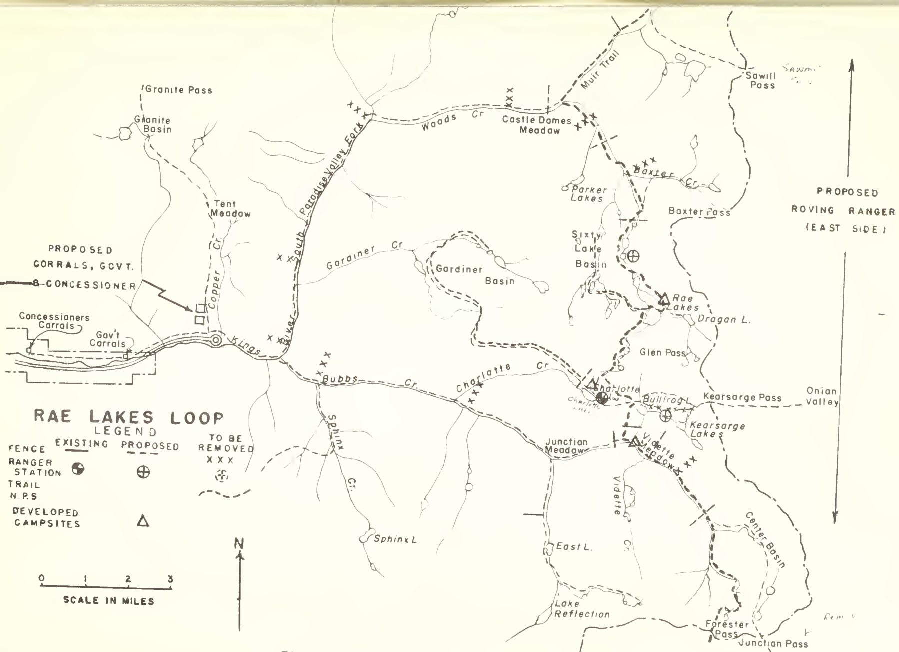


Fig. 11 The Rae Lakes Loop Management Plan Map.

PART II - DESCRIPTION OF TYPICAL PROBLEM AREAS AND MANAGEMENT RECOMMENDATIONS

Detailed management plans for virtually all problem areas in both Parks were presented by the Committee in its report of April 1961; in this report only selected sample areas are discussed. The examples used in Part II have been chosen to illustrate how the general guidelines developed in Part I were applied to problems encountered in the field.

The first area to be discussed is the Rae Lakes Loop, one of many problem areas in these Parks. Since it illustrates many typical overuse problems and the application of solutions developed by the Committee, it is discussed in considerable detail. Other areas which illustrate additional types of situations are discussed in a more abbreviated manner.

THE RAE LAKES LOOP

Introduction

Loop trips through a park are popular because the visitor does not have to retrace his steps to return to his starting point. If the loop takes him through an area of superlative scenery that offers good fishing and camping opportunities, then further popularity is assured. The Rae Lakes Loop has enjoyed such popularity for over twenty years, and despite damage and crowding, this popularity shows little sign of diminishing.

A conservative estimate of visitor use during July, August and September, is 8,000 persons. Stock use runs as high as 55 head per day during the month of August. Forage for stock does not exist in any appreciable quantity or quality, and is grazed off by mid-August. Forage is not the only resource that is in critical balance; firewood for cooking and keeping warm is almost nonexistent at the more popular campsites.

By 1959, due to extensive damage at Bullfrog Lake, a heavily visited spot along the loop route, the parks were forced to restrict camping and eliminate all grazing. With choice adjacent areas now in danger of being seriously impaired and eventually destroyed by visitor use, a management plan for the Rae Lakes Loop is imperative.

Description

Each of the eight sections of the Rae Lakes Loop described here corresponds to a normal day of hiking or riding.

Section 1 - Bubbs Creek-Charlotte Meadow-Junction Meadow

Beginning at an elevation of 5,200 feet, the trail climbs gradually through black oak, pinon and willow, finally reaching lodgepole pine and aspen thickets. Near the junction of Sphinx Creek and Bubbs Creek, about four miles from Road's End, the visitor arrives at the first good campsite. A drift fence is located at this point to prevent stock from returning to Cedar Grove; but this fence would not be needed under the management plan indicated below.

The area from Sphinx Creek to Junction Meadow serves those persons who want to get away from the crowded campgrounds at Cedar Grove, but who are not physically able to get very far from a road. This area also affords an overnight stop for hikers coming back out of the high country. All along this route, forage is the major concern for the stock party. Several small meadows of less than one acre afford overnight grazing for one or two head of stock.

Charlotte Meadow, 5.5 miles from Road's End, is the largest of this group of small meadows, and is of prime importance. This meadow has been overgrazed for a number of years and, because of its strategic location and importance in the overall grazing plan for the Rae Lakes Loop, it must be properly managed.

With Junction Meadow, 8.5 miles from Road's End, in critical condition and now closed to all grazing, the nearest place other than Charlotte Meadow where stock may be turned out unrestricted is above Vidette Meadow, 14 miles from Road's End.

At the present time a drift fence exists above the Charlotte Creek crossing of the Bubbs trail; but, as indicated below, it is not needed.

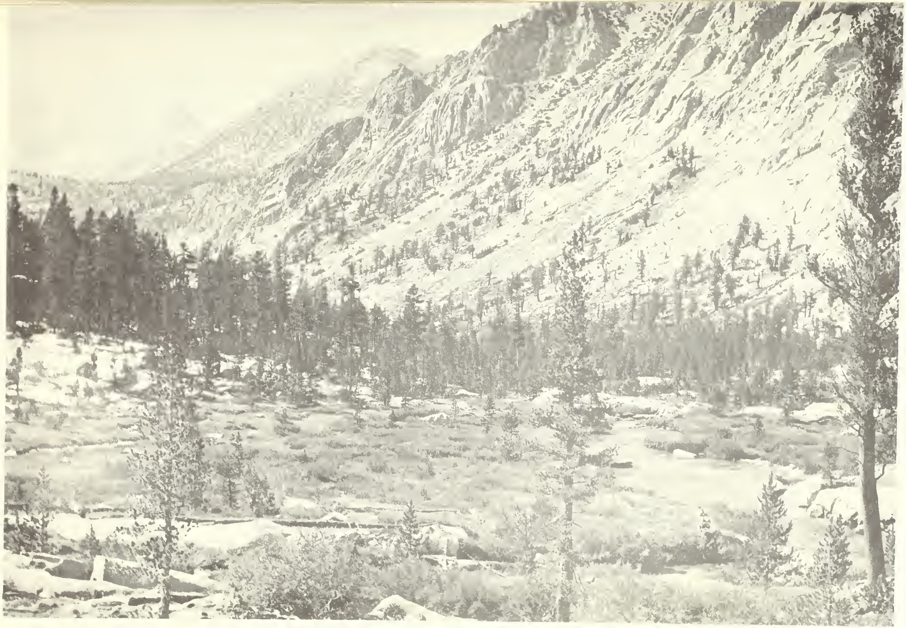


Fig. 12. A small portion of the extensive grazing unit that is located 2 miles southeast of Vidette Meadow along the John Muir Trail.

Section 2 - Vidette Meadow

Vidette Meadow is situated at the junction of the John Muir Trail and the Bubbs Creek Trail. This junction is 9 miles from the east side approach road at Onion Valley, and 14 miles from Road's End out of Cedar Grove. For those renting stock at Cedar Grove there is an additional 5 miles to ride because the present location of the commercial pack station is not at Road's End but 5 miles lower down.

Vidette Meadow is one of the most scenic meadows in the Sierra. Surrounded by towering peaks and lodgepole forest, with Bubbs Creek flowing nearby, it is a favorite camping spot. It is heavily used by people coming in via Kearsarge Pass from Onion Valley, as well as by those who begin their trip from Cedar Grove. When Bullfrog Lake was closed to camping and grazing, Vidette Meadow was one of three areas to which the public was directed.

Prior to 1960 there had been no grazing restrictions at Vidette Meadow. But beginning in 1960, stock parties had to be allowed but one day of grazing, with an allowable maximum of 20 head per party. If a longer stay in the area was planned, they were directed to take their stock above Vidette Meadow and place them in an adjacent area where unlimited grazing was allowed. This restriction was successful from two standpoints: It materially reduced damage to the meadow, while at the same time offering a good alternate grazing and camping site (above the meadow) in lieu of the badly overused Bullfrog Lake area.

The Committee inspected the area in July and found conditions fairly good, but with indications that further reduction in stock numbers would have to be initiated. Another inspection in mid-October, after a summer of heavy use, made clear that the recommendations made in July would have to be put into effect.

Factors contributing to the continued decline of Vidette Meadow probably include disrespect by some parties of the restrictions on length of stay, and overflow by excessive numbers of stock into the area, following the closures at Bullfrog and Kearsarge Lakes. Undoubtedly, the restrictions placed in force in 1960 aided greatly in protecting this meadow, but more stringent grazing regulations must be applied in the future.

Present campsites are similar to those found elsewhere in the back country and contain a fireplace, makeshift table, and campfire circle. The present campsites have been built by stock parties and large organized groups. In addition to these sites, backpackers have constructed many small rock fireplaces along the stream and near the trail.

An average day in August finds as many as 50 persons camped in the area. Litter, sanitation, and the cutting of live trees present typical problems.

Section 3 - Kearsarge Basin

Two miles north and east of Vidette Meadow, and just off the John Muir Trail, are Bullfrog Lake and the Kearsarge Lakes. These areas have been discussed repeatedly as problem areas in previous reports, for they are situated just inside the major east side entrance to the parks, at a point of maximum back-country use.

From the visitor standpoint, these lakes typify what a high mountain area should offer, for Kearsarge Basin, which contains these lakes, is the ultimate in High Sierra scenery. To these attractions is added accessibility over a good road from Highway 395, near Independence, to Onion Valley. From this road's end it is only five miles to Kearsarge Pass, and two additional miles into the Basin. This makes it possible for a person to leave Southern California early in the morning and camp at Bullfrog Lake or Kearsarge Lakes that same night.

At Onion Valley, two pack stations stand ready to rent a horse to the visitor, pack his dunnage on a mule, and transport him into the back country. If the visitor wants to set his own pace and does not desire to avail himself of packing services or a horse to ride, he can rent a burro to carry his outfit; or, as the majority of users do, he can backpack.

With all these means of transportation available, the Kearsarge Basin area attracts a multitude of people annually. On a peak day in August as many as 300 persons reach the area from Kearsarge Pass or the trail up from Cedar Grove.

By 1959, after more than 30 years of ever-increasing use, there was a severe shortage of firewood, gradual but progressive destruction of the fragile subalpine lakeshore, depletion of grass because of overgrazing, vast quantities of debris and

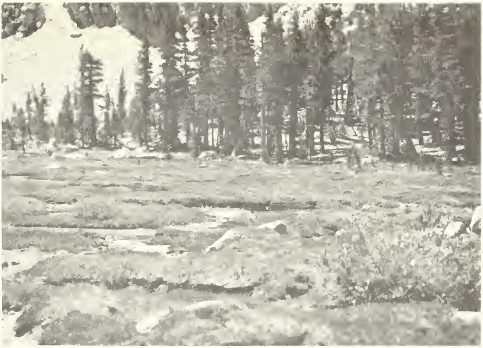


Fig. 13. Charlotte Lake Meadow

May well be among the most southerly of sphagnum-rich high meadows in the Western United States. Continued misuse is gradually destroying this meadow.

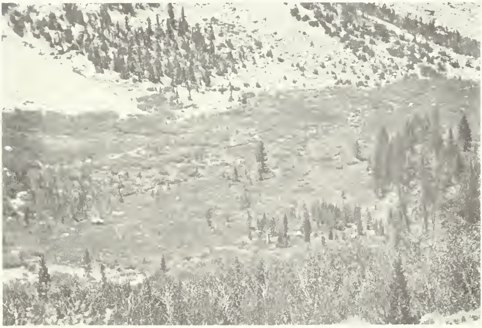


Fig. 14. Meadows directly below Charlotte Lake Meadow are in good condition and afford an alternate grazing site.

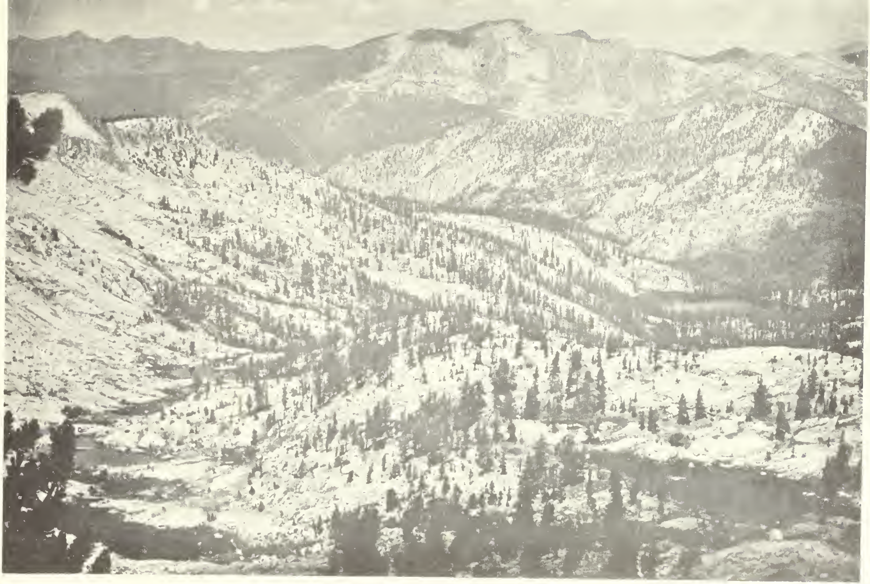


Fig. 15. Gardiner Basin

A highly scenic, true wilderness unit that should be retained in its present unmodified condition.

litter, and an acute sanitation problem. Unless immediate controls are placed on visitor use, such a pattern of overuse, if continued, can only bring eventual destruction to this scenic basin.

To initiate corrective action, the park staff began in 1959 by eliminating all grazing and offering an alternate grazing site on the benches north of the lakes. Camping was eliminated at the west end of Bullfrog Lake. This portion of the lakeshore had received maximum damage and on weekends it had taken on some of the aspects of a Coney Island. Camping was still permitted at the east side of the lake, as well as at Kearsarge Lakes. Those not desiring to remain in the basin were free to go to Vidette Meadow, Charlotte Lake, or Rae Lakes.

By 1960, after only one full summer of trial operation, a decided improvement had taken place in all aspects of visitor pressure and area protection. While the same numbers of people continued to pass through the area, fewer were inclined to stay, due to the restrictions imposed on camping and grazing. Also of importance were the efforts of the ranger at Charlotte Lake, who spent many hours contacting people entering the basin and dispersing them to other areas.

The Committee inspected the basin in July 1960, and was favorably impressed with the results achieved. The success of this initial venture in back-country restrictions was due to full cooperation from local packers, and a sound management plan.

Unfortunately, the beauty and accessibility of Kearsarge Basin have resulted in the necessity of classifying it as a modified wilderness area. The area clearly illustrates that intensive public use will require increasing regulation if its remaining wilderness aspects are to be retained.

Section 4 - Charlotte Lake

One mile west of the Kearsarge Basin, and one-half mile off the John Muir Trail, lies Charlotte Lake. The area has long been a favorite with large organized groups such as Boy Scouts and the YMCA. There is abundant wood, adequate camping space, and three-quarters of a mile below the lake, ample stock forage. Heavy visitor use has been recorded here during the past two summers, due mainly to the restrictions imposed on public camping and grazing in the Kearsarge Basin. In 1960, 850 campers were registered, with an average stay of 5.5 days.

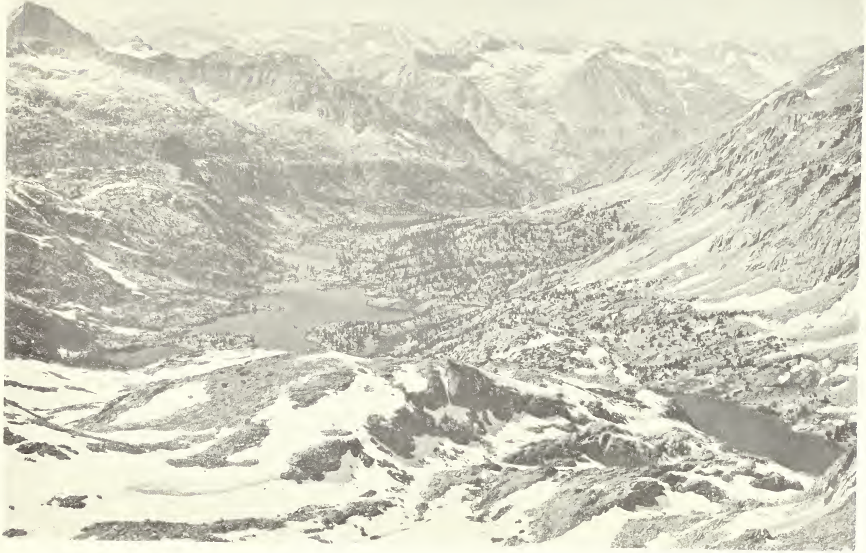


Fig. 16. The chain of lakes, of which Rae Lake (Upper) is the largest, lies like a string of beads in the upper end of the long, descending glacial valley of the South Fork of Woods Creek.

At the present time a ranger is stationed there in a one-room cabin constructed by the State for snow-survey purposes. The area, because of ease of access, and heavy visitor use, is classified as a modified wilderness unit.

Section 5 - Gardiner Basin

The headwaters of the South Fork of Gardiner Creek originate in Gardiner Basin, which is a wild and beautiful cirque, isolated by the ruggedness of the terrain and the lack of an easy trail. Its numerous lakes and small meadows make this a highly scenic, true wilderness retreat (Fig. 15).

Section 6 - Rae Lakes

This chain of lakes, of which Rae Lake (Upper) is the largest, lies like a string of beads in the upper end of the long, slowly descending glacial valley of the South Fork of Woods Creek (Fig. 16). Flanked by scenic domes and the towering peaks of the main Sierra Crest, this is one of the most wildly beautiful spots in the entire Sierra.

Long popular with the public, this area averages 1,500 visitors annually, totaling 7,500 camper days. As a result of long usage, wood and forage are in extremely short supply and immediate steps must be taken to curtail the increasingly destructive demands placed on these resources.

Unfortunately, there are no nearby areas where dispersal of visitors would be practical or desirable. It is, therefore, of utmost importance that solutions be reached now that will adequately handle existing and future visitor use for this entire area.

Section 7 - Sixty Lake Basin

Sixty Lake Basin contains a magnificent array of small, pine-rimmed, silvery lakes set in clean, gray granite. So close together are many of these lakes that often one rides between them on a narrow isthmus of granite and green grass. Hemmed in on all sides by towering granite walls, and reached by a primitive, winding trail, the area most certainly qualifies as wilderness.

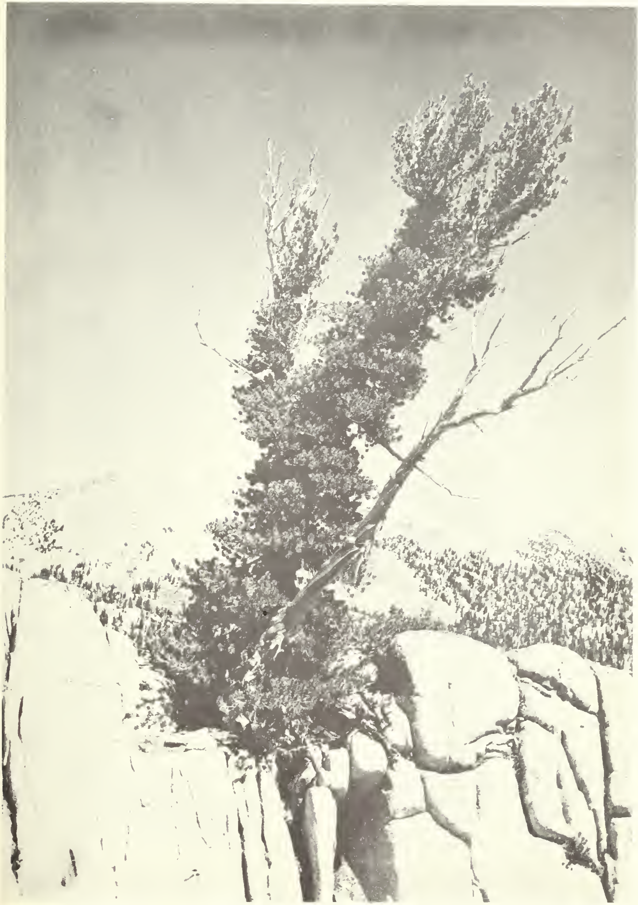


Fig. 17. In the search for firewood the camper often cuts these picturesque pine snags, which are as much a part of the natural scene as the lakes and peaks.

This basin is wilder and less frequented than the populous Rae Lakes, but over the years it has been subjected to ever-increasing use. There is an estimated 75 acres of shorthair forage scattered along the numerous promontories and narrow draws, but much of this grazing is very close to the water supplies used by campers. By reason of its smaller size, this basin is even less able than Rae Lakes, to satisfy the long-range needs for wood or forage. Therefore, it cannot be used as an overflow area to relieve conditions elsewhere.

Section 8 - Rae Lakes to Paradise Valley

Below Rae Lakes the John Muir Trail descends the South Fork of Woods Creek with increasing rapidity on its way to the canyon of Woods Creek. The lodgepole forest becomes thicker, then gives way to red fir, with scattered stands of cottonwood and some Jeffrey pine. The lodgepole stand has been severely damaged by an infestation of needleminer for about four miles, from near Baxter Creek to the junction of the South Fork with the main Woods Creek. Scattered at intervals along the South Fork of Woods Creek are several small woodland meadows and some wet meadows.

Continuing down the main Woods Creek to the junction of the Kings River, cedar and cottonwood predominate. Still farther down lies Paradise Valley, a deep, shaded woodland canyon throughout whose length cottonwoods, white fir, cedar and aspen, and Jeffrey, yellow, and some sugar pine extend in almost uninterrupted profusion. Two principal wet meadows in Paradise Valley total approximately 20 acres.

There are several undeveloped campsites between the mouth of Baxter Creek on the South Fork of Woods Creek and Castle Dome Meadow in the canyon of Woods Creek. From the Kings River down through Paradise Valley there are numerous additional campsites. Travel begins fairly early in this region, usually by June 15, or as soon as the Kings River and Woods Creek can be crossed safely.

A short distance from where the main Woods Creek joins with the South Fork of Woods Creek, a small area is marked by an old sign as having poison forage. Whether or not this condition still exists is unknown. Under normal conditions, and an adequate management plan, it is doubtful if poison forage in this area will be much of a problem.

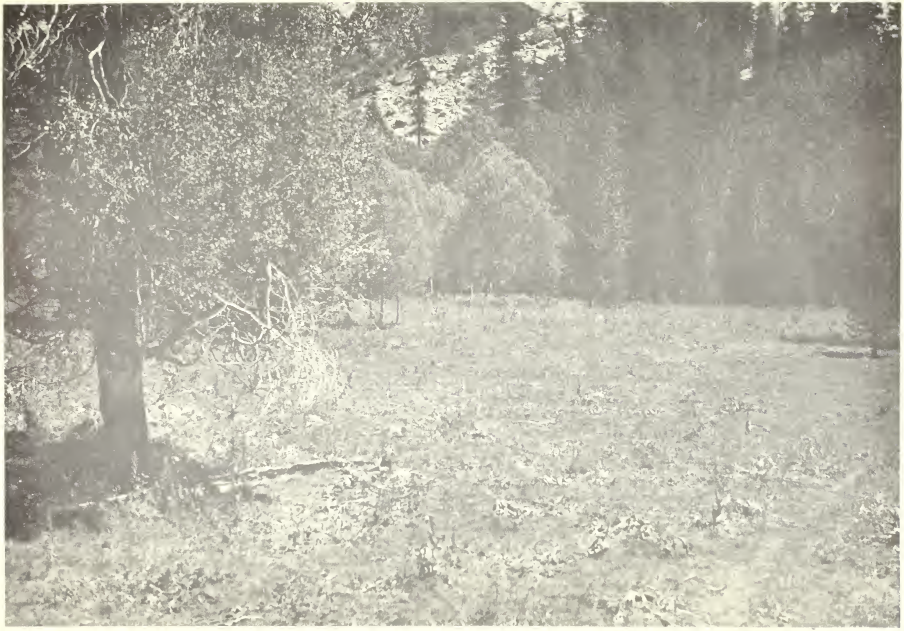


Fig. 18. The meadows in Paradise Valley are in an advanced stage of extreme deterioration, due to intensive overgrazing.

Of great concern, however, is the rapidly changing condition and appearance of Castle Dome Meadow, which is rapidly giving way to false hellebore, and also more slowly, but surely, to the forest. Sharsmith (1959) indicated that no other meadow covered by his study showed evidence of a more rapid invasion within recent years than Castle Dome Meadow.

Farther down from Castle Dome Meadow is Paradise Valley, with two principal meadows, Middle Meadow and Lower Meadow. In addition to these two principal meadows, several small meadows of an acre or so are scattered along the valley.

Lower Meadow is the largest, and therefore the most important forage area in Paradise Valley. However, both Middle Meadow and Lower Meadow are in an advanced stage of extreme deterioration due to overgrazing.

These meadows were beginning to show signs of severe damage in 1940. In recent years this damage has reached the proportions of a nearly irreversible catastrophe, with extensive areas of former meadow sod now replaced by loose, dry sand, sparsely covered with weeds. The current ecological condition of this area has been adequately described in Dr. Sharsmith's report, which should be referred to for further information.

The study Committee fully agrees with Dr. Sharsmith's ecological appraisal of the meadows of this area. The scarcity of forage in this portion of the Kings Canyon is such that even the poorest meadow is of strategic importance, and the loss of even one meadow only increases the burden upon the others.

Management Objectives

1. Continue the restoration of Charlotte Meadow (in Bubbs Creek Canyon) by putting into effect the improved grazing practices recommended below. Strengthen enforcement of the grazing closure at Junction Meadow. Accomplish cleanup of litter and increase protection patrols.

2. Halt further deterioration at Vidette Meadow by establishing developed campsites to control and confine indiscriminate camping. Establish campsites away from the immediate vicinity of the meadow for the large groups who frequent this general area.

3. Provide adequate inspection and enforcement to assure success of management objectives there.

4. Give complete protection from grazing to the meadows bordering Bullfrog Lake and Kearsarge Lakes. Reduce human trampling in that area by not improving the fishery resources in the lakes. Remove litter.

5. Protect the shore and meadow at Charlotte Lake from grazing. Establish designated campsites to eliminate destructive camping use. Maintain the current fishery resource in the lake.

6. Preserve the true wilderness flavor of the secluded and fragile subalpine area of Gardiner Basin by introducing no conveniences or "improvements" that would bring in still more people. The area already receives close to maximum use.

7. At Rae Lakes, eliminate pack and saddle horse grazing and begin to regulate the use of burros. Establish developed campsites to control and confine camping use that has been allowed to go unchecked. Preserve standing dead pines which are scenic in their own right, but are vanishing under pressure for firewood, and require that all large groups be equipped with gasoline stoves.

8. Maintain Sixty Lake Basin in its present primitive condition as a relief from nearby regions which will receive ever-increasing use, and, as in the case of Gardiner Basin, refrain from encouraging additional new travel, with all its damage and complications, by making extensive trail improvements.

9. In the section from Rae Lakes to Paradise Valley, reverse the severe deterioration in certain meadows caused by overgrazing. Maintain a careful watch on the needleminer infestation and endeavor to keep it localized. Provide increased ranger patrol and annual litter cleanup.

Conclusions and Recommendations

1. Grazing Regulations

Eliminate all pack and saddle stock grazing, other than by burros, beginning at Road's End in Cedar Grove and extending through Junction Meadow. Stock parties wishing to camp in this area would be required to pack hay. Government stock engaged for servicing trail crews or packing the crew into the area to perform work would be required to observe the same restrictions. Government stock, when in use, would be kept in the corrals at Cedar Grove.

Burros and walking mule parties would be allowed to graze overnight in this area; if a longer stay were planned, they would be required to pack supplemental feed. Junction Meadow was closed to grazing in 1960 and should remain closed till fully recovered.

At Vidette Meadow establish and post an opening date for grazing based on the spring readiness of soil and forage. Since this date probably will not vary more than two weeks one way or the other each season for this particular meadow, June 15 is the recommended opening date.

Allow two wrangle horses per party to be kept in Vidette Meadow, with no time limit imposed at this point. Require that the remaining stock belonging to each party be placed above the East Vidette drift fence. This excellent large area is approximately one-half mile southeast of Vidette Meadow on the John Muir Trail (see Fig. 12).

All organized groups of ten or more persons would be directed to the area above the East Vidette drift fence. This area is suitable for such group use as well as for the overflow of smaller parties.

Allow burro and walking mule parties two days grazing in Vidette Meadow, but with picketing prohibited (the meadow is fenced). Set up a fenced study plot in this meadow to properly measure range conditions. Fencing for this project already is on hand at Park Headquarters.

In Kearsarge Basin the meadows bordering Bullfrog Lake and Kearsarge Lakes should remain closed to all grazing until such time as complete recovery of this badly damaged area takes place. The benches north of the trail to Kearsarge Pass can be designated as alternate grazing areas for burros.

If pack and saddle stock are kept in the area overnight, they should be fed hay. If burros are held overnight in this area instead of being grazed north of the Kearsarge Pass trail, it should be on the same condition.

Of the Charlotte Lake group of wet subalpine meadows, the one in greatest need of relief from continued misuse is Charlotte Lake Meadow itself, which is the first meadow of the series just below the lake (Fig. 13) and not to be confused with Charlotte Meadow in Bubbs Canyon. In 1942 Charlotte Lake Meadow was suffering severely from overgrazing and trampling. In

Dr. Sharsmith's report of 1959, he adequately described the continuing pressure on this meadow and its ecological importance to these Parks. The Committee recommends that all grazing be eliminated at once from this meadow, and that no grazing be allowed in the immediate vicinity of Charlotte Lake.

The four meadows commencing about three-quarters of a mile below the lake are in good condition and no grazing restrictions are recommended for them at this time. However, a close watch should be kept and at any sign of misuse, contributing factors should be corrected promptly.

It is believed that overuse of these four meadows can be prevented by a program of alternating use, if this should become necessary.

At Rae Lakes the heavy, unrestricted stock travel recorded since 1936 has seriously taxed the shorthair and wet meadow forage available in this basin. Fortunately, no irreversible damage has resulted from the intensive grazing so far. What damage exists is mostly local and involves little or no erosion, due to the flatness of the terrain.

Campers with burros show a tendency to stake out or tie up their stock close by instead of turning it loose in the meadows below Middle Rae Lake.

Due to the elevation of Glen Pass (12,409 feet), it is usually mid-July before the commercial packers from Onion Valley are able to bring people to Rae Lakes. A few burro parties do cross Glen Pass before July, and some early stock travel arrives from Cedar Grove via the South Fork of Woods Creek.

But even though natural obstacles delay entry to this region, by the middle of August most of the shorthair forage has been grazed down, and the wet meadows are badly trampled. To remedy this situation the Committee agrees that commercial packers must pack a feed concentrate, or hay, when visiting Rae Lakes or Sixty Lake Basin.

Spot trips should be encouraged for Rae Lakes, and the holding of stock should not exceed 24 hours. If pack and saddle horse parties wish to remain longer and want their stock kept with them, it will be necessary for the packer to take this stock down to the grazing unit which the Committee recommends for establishment just south of the Baxter Creek junction. Since most of the pack and saddle stock from Onion Valley will only remain overnight, it is not unreasonable to require hay or concentrated feed to be packed in for that brief period.

Stock parties from Cedar Grove, or those traveling the John Muir Trail from the north or south, should be advised of grazing restrictions by signs or ranger contact. In this way the designated grazing site would be well known in advance of arrival at Rae Lakes. All stock parties should make camp in the area from the vicinity of Middle Rae Lake to the junction of an unnamed lake and the trail to Baxter Pass.

At Sixty Lake Basin, eliminate at once all grazing because of the resulting pollution of water supplies, as well as damage to the fragile vegetation and scenery. Reserve the area for backpackers, spot parties, and day use by visitors with livestock.

In the section from Rae Lakes to Paradise Valley, in order to offer a better grazing unit in lieu of Rae Lakes and Castle Dome Meadow, it will be necessary to program better utilization of the forage along the South Fork of Woods Creek. This can be accomplished by relocation of drift fences, and by signs that will direct stock parties to designated grazing areas.

Castle Dome Meadow should be closed to all grazing until full recovery takes place. Only if grazing is terminated immediately will meadow recovery from the present weed stage occur during the next five to ten years.

In view of the continuing overuse of Long and Middle Meadows, and the probability that the ever-increasing invasion of weeds and forest may soon become irreversible, the Committee recommends the exclusion of grazing in Paradise Valley, with the exception of overnight use by burros. Moreover, if burro use becomes too heavy, and it is obvious that damage is still occurring, the only alternative will be to close the valley to grazing even by burros.

Pack and saddle horse parties should be required to carry hay if they stop in Paradise Valley.

2. Drift Fences

The primary concern when locating a drift fence is to avoid concentrating grazing so that it becomes detrimental to an area. Properly located, a drift fence will protect areas that should not be grazed, yet allow properly managed grazing on other areas that may be grazed without damage. Although a drift fence is not justifiable solely for the convenience of the stock user, feasibility and convenience are important considerations if this management tool is to be effective.

The drift fences at Sphinx Creek and above Charlotte Creek should be removed. They will no longer serve any purpose if pack and saddle stock grazing is eliminated; their continued presence would constitute an unnecessary artificial intrusion, and would invite violations of the regulations.

Of the three drift fences now in the immediate vicinity of Vidette Meadow, two should be retained at their present locations; the third should be moved down the John Muir Trail one-half mile closer to the meadow from its present site on the switchbacks up to Bullfrog Lake.

To keep stock from drifting beyond the upper limits of Bubbs Creek, and eventually winding up on the benches below Forester Pass, a drift fence is needed close to the junction of the Muir Trail and Center Basin trail.

This system of drift fences would accomplish the objective of protecting Vidette Meadow, while providing a good grazing unit of some three miles on either side of Bubbs Creek.

To keep stock out of Charlotte Lake Meadow, it will be necessary to construct a drift fence below it, thus preventing animals from drifting back up from the meadows below this point. Under this arrangement it will be necessary to take stock down from the lake area and turn them loose beyond this fence. This is a distance of only three-quarters of a mile, and must be a definite requirement.

To protect the Rae Lakes area, where there will be no grazing, a drift fence should be installed at a point below the last meadow south of the Baxter Creek trail junction. Less than 100 yards of fence will be required. This will eliminate the possibility of stock drifting up to Rae Lakes from the grazing unit farther north, which extends to Paradise Valley.

In the area that extends from Baxter Creek, below Rae Lakes, to Paradise Valley, the location of existing drift fences is such that very little of the available forage along the South Fork of Woods Creek is being utilized.

At present there are three drift fences along the South Fork of Woods Creek and on Woods Creek proper; they are in such poor condition that at present they have little value.

The present drift fence on the South Fork near the mouth of Baxter Creek should be removed. It illustrates the disadvantages of a location chosen on the basis of convenience alone, for it does not allow adequate distribution of stock.

The proposed new fence near the junction of the Baxter Pass trail with the John Muir Trail will be an effective replacement. It will halt any stock attempting to return to Rae Lakes or to Onion Valley. Its installation, together with the removal of the Baxter Creek fence, will provide a fairly good grazing unit (Fig. 11).

To relieve the grazing situation at the forks of Woods Creek, it is recommended that the present fence just above these forks be removed. A new fence should be constructed in the vicinity of the small creek that drains Parker Lakes (Fig. 11). This will allow a better dispersal of stock, and to some degree could help to spread camping too, since stock parties like to camp near to where their stock is grazing.

The drift fence at the west end of Castle Dome Meadow will no longer serve any purpose if grazing is eliminated in this meadow; therefore it should be removed. To protect the meadow, it will be necessary to construct a fence a short distance above the east end of the meadow (Fig. 11). This fence will halt the downward drift of stock from Woods Creek to Castle Dome Meadow and back to Cedar Grove.

There are two drift fences in Paradise Valley--one at the upper and one at the lower end. There also is a set of trail bars just above the junction of Bubbs Creek and the Kings River. These should be removed because they will no longer be necessary when grazing in Paradise Valley is eliminated.

3. Burros

The problems created by burros, described on page 13 are particularly acute in Kearsarge Basin.

The two commercial packers at Onion Valley run 30 burros each; the pack station at Cedar Grove has 40 burros for rent. These burros are primarily rented by people making the loop trip, or scheduling a stop at Rae Lakes en route to other areas.

It is recommended that packers who operate out of Onion Valley be limited to a specified maximum number of burros. This number should be those animals that were owned by each packer at the close of 1961. Replacement of aged or crippled

animals would be approved. If the packer sells a burro at any time while the permit is in force, other than for age or cripple replacement, the total owned after the sale would become the new maximum number.

Adoption of this program of limited replacement of burros for the Onion Valley and Cedar Grove pack outfits, should bring about gradual decline in damage.

It may become necessary to apply this same management approach to other areas where the use of burros is proving detrimental to mountain meadows.

It is also recommended that any commercial packer who does not now own burros be prohibited from purchasing them for rental to park visitors. All Special Use Permits issued in 1962 should contain a statement to cover this requirement.

4. Commercial Pack Outfits

Over the past several years a close look has been taken at the operations carried on by the two pack stations that now operate out of Onion Valley, in the Inyo National Forest. These outfits operate almost entirely in the Parks, under a Special Use Permit, renewable every two years.

In conversation with past and present owners of these two stations it is pretty much agreed that there is not enough business, or the right type, to adequately sustain more than one outfit. With more and more people hiking and backpacking over Kearsarge Pass instead of being packed in, it is apparent that the future of pack and saddle horse rental on a scale sufficient to support two stations is dubious. Current stock restrictions, and those now being recommended to prevent further destruction of this area, undoubtedly will further influence local packing operations.

The grazing damage in this fragile alpine area clearly indicates that stock use is exceeding the carrying capacity. Therefore a reduction of stock numbers by integration of the two pack outfits would be highly desirable.

It is quite probable that restrictions and a general lack of business will determine whether one outfit sells out to the other. If this does happen, there should not be more than one Special Use Permit in effect at Onion Valley for operations within the parks. Cooperation with officials of the Inyo National Forest will be essential if the ultimate goal is to be achieved.

In the Cedar Grove area, the existing road was extended to Copper Creek in 1957. As a result, persons owning their own stock could truck them several miles farther into the wilderness. For these private stock parties, and for the backpacker, this road extension eliminated several miles of the hot and dusty trail that formerly had to be traveled to reach campsites and grazing areas on Bubbs Creek and above Paradise Valley.

However, the extension of this road did not provide a like benefit for the principal commercial pack outfit at Cedar Grove, nor for the government, whose corral is presently located only a short distance from the commercial outfit. It is still a four and five mile ride--paralleling the automobile highway--to reach Copper Creek from these corral locations.

Although this additional distance may not seem important, in this particular case it is extremely significant because a normal day's travel by livestock still brings a party to the severely damaged areas of Bubbs Creek and Paradise Valley. Thus, the added distance creates weighty range-conservation problems whose solution depends on moving both corrals to Road's End at Copper Creek.

Moving these corrals to Copper Creek would allow stock to travel over two hours farther in either direction, and for the most part this would put the stock above the areas that are now suffering the most from grazing abuse. The result would be to remove the present devastating grazing pressure from the meadows in Paradise Valley; it would also greatly reduce the pressure now placed on Vidette Meadow and the meadows along Bubbs Creek.

5. Fishery Resource

To discourage extended camping in Kearsarge Basin, it is recommended that the fishery resource not be improved in any manner.

There are excessive numbers of small fish at Charlotte Lake. These are rainbow and eastern brook trout. Because the fish are stunted in their competition for food, additional plantings would only make matters worse. Fishing should be encouraged here as much as possible to reduce this competition.

The Rae Lakes contain abundant eastern brook trout. There is no stocking schedule for these lakes. Natural reproduction makes stocking unnecessary; in fact, stocking would be harmful because these lakes are insufficiently fished to permit uncaught fish to grow to optimum size. No restrictions on fishing are proposed.

6. Litter

Cleanup of the Bubbs Creek-Charlotte Meadow-Junction Meadow area should be accomplished at least twice during the summer, preferably in the middle of the travel period and again at the end of the season. Unsightly shelving and other unauthorized "improvements" should be removed at cleanup time.

At Vidette Meadow it will be necessary to schedule an annual maintenance program. This work should be performed once during the travel season, and again at the end of each season.

A two-man crew can adequately work this area, cleaning campsites, dismantling junk camp structures, and burning litter. The area was well cleaned in 1960; it should not be allowed to fall back into a sorry condition. The report on Back Country Cleanup (Briggle, 1960a) can serve as a guideline for this work.

In addition to the 78 sacks of cans that were collected from Kearsarge Basin in 1958 by the Sierra Club, this area was thoroughly cleaned in 1960. As recommended in the report covering cleanup activities (Briggle, 1960b), Kearsarge Basin should receive annual maintenance.

Charlotte Lake, the Rae Lakes, and the area from Rae Lakes to Paradise Valley, were cleaned up in 1960. Heavy use will require annual cleanup of these areas.

7. Developed Campsites

When considering government-developed campsites at the more heavily used areas along the Rae Lakes Loop, the Committee kept firmly in mind several important points. These were: Protection of park values, public health and safety, and the question as to whether a developed campsite would detract from the wilderness atmosphere. Also considered was the fact that a developed site tends to create a destination point for the public.

All areas where a developed site has been recommended have been public destination points for over 30 years, with the result that the wilderness aspect of these areas has long been modified.

For example, Vidette Meadow is a convenient destination from the road's end at Onion Valley. The John Muir Trail skirts the edge of this meadow, promoting concentrations of visitors. Much of its wilderness charm still remains, but this can be retained for the future only by realistic management, including the use of developed campsites as a management tool.

Concentrations of people in rather confined locations such as Vidette Meadow create public health and safety problems. To take care of the public health and sanitation requirements, it is necessary that toilets be constructed away from sources of drinking water. To control camping and keep it away from the most fragile areas, constructed campsites are essential.

The campsite development proposed at this time for Vidette Meadow would comprise 15 sites, spaced at a minimum distance of 600 feet apart. These campsites should be laid out along one side of the meadow, preferably the north side, so as to eliminate the necessity of stock parties crossing the meadow in search of camping accommodations.

Each site would be furnished with a camp table (preferably constructed of native materials); fire grill; hitch rack for stock parties (100 feet from camp); and a Good Manners sign. Visitors must be prohibited from developing their own camps in this developed area after it becomes full.

To take care of the needs of latecomers, an overflow area should be designated along Upper Bubbs Creek, toward Center Basin, above the East Vidette drift fence. Campsites in this area could be left undeveloped. Four latrines should be adequate for sanitary needs at this time in the designated campsite area.

Because wood has been reduced over the years to a pitifully short supply throughout Kearsarge Basin, the Committee does not recommend developed campsites in this area. The fragile west end of Bullfrog Lake should remain closed to all camping.

At Charlotte Lake a maximum of ten developed campsites is recommended, spaced at least 600 feet apart to provide minimum privacy. The sites should be so located as to take advantage of trees for screening and windbreaks, and should be out of sight

of the trail. Each site should include a camp table (preferably constructed from native materials), fire grill, hitch rack away from the campsite, and a Good Manners sign.

Additional campsites, to take care of peakloads, should be located in separate nearby overflow areas. Upon leaving any overflow-area visitors will be expected to take down whatever they have put up.

While it is not proposed at this time to place a limit on the length of time campers can stay at Charlotte Lake, such a restriction should be considered as a management tool for possible future use.

As in other areas of heavy visitor use where there is a shortage of wood or where the use of wood must be held to a minimum, it is recommended that large groups be encouraged to bring gasoline stoves. Since the conservation of wood is vital to such areas, the use of large warming fires also should be discouraged.

Four latrines will be adequate for Charlotte Lake.

The campsite development recommended for this area is for minimum requirements, but until there is sufficient time to measure the results of the initial program, no further development should be planned.

Good campsite areas extend from near Middle Rae Lake to the last lake near the Baxter Pass trail junction, and it is in this general area that designated campsites should be developed. A minimum of 20 campsites will be needed. They should be situated so as to take advantage of natural windbreaks and proximity to wood and water; they should also afford adequate privacy.

Six sites should be laid out to care for large groups and stock party use. These should be located in a single area and should be well away from campsites used by small groups and individuals. All sites should be spaced at least 600 feet apart.

All designated sites should include a cookstove designed to conserve as much fuel as possible; a rustic table; a hitch rack located 100 feet away from the camping area; and a Good Manners sign. Because of the scarcity of trees, tables will have to be constructed of half logs, brought up from the downstream lodgepole pine area near Baxter Creek and bolted together.

The balance of the sites would serve backpackers and small groups, with or without stock. All pack outfits should be encouraged to bring in gasoline stoves, and it is recommended that this become a requirement at Rae Lakes for all large groups. It is recommended that five comfort stations be constructed.

Camping must be confined to designated sites, and development of additional sites by visitors in the designated area will have to be prohibited.

An overflow camping area should be designated downstream from the prepared campsites for use on peak travel days by those who arrive after all the prepared campsites have been occupied. During periods of heavy visitation it may become necessary to establish a limit on length of stay at Rae Lakes.

Despite current heavy use, the Committee does not recommend developed campsites in the Woods Creek-Paradise Valley area. Numerous rock fireplaces are scattered along the route, and these appear adequate for the type of use received. Perhaps it will be necessary to reappraise the camping needs at a later date, particularly after an evaluation of the management results obtained at Rae Lakes and Vidette Meadow. All unsightly campground "improvements" should be torn out and, due to fire hazard, care should be exercised in permitting indiscriminate camping, in this region.

8. Trail Plans and Maintenance

The Bubbs Creek trail is a Class A trail. It receives heavy use and therefore holds a high priority for opening and maintenance. This trail should be opened as early in the season as possible, preferably in advance of tourist travel.

Opening trails, as distinct from maintenance, consists only of removing major obstacles to stock, such as logs and boulders, and emergency repairs of unsafe sections of trail.

The trail system in the Kearsarge Basin is considered as Class A (heavy use - high priority for opening and maintenance). To reduce travel through the Basin to a nondestructive level, consideration should be given to constructing a trail from near Kearsarge Pass that would parallel the north side of the Basin at an elevation well above the present trail. There is a little-used trail in this approximate location now, and it is believed that with a limited amount of new construction the two could be tied together. The re-routed trail would join the Muir trail above and north of Bullfrog Lake.

The trail to Charlotte Lake branches off from the John Muir Trail at the sandflats above the lake. From this point to Charlotte Lake, a distance of one mile, the trail is considered a Class A trail. Continuing along the north shore of the lake, the trail eventually terminates at Gardiner Basin. Some work is needed on the trail before it reaches the lake; drains, re-routing, and a more gradual grade would be desirable. Some re-routing of the trail will be needed along the north side of Charlotte Lake Meadow up to the drift fence, to relieve the damage that is now being done to this meadow.

Previous reports have suggested rehabilitating the old, long-abandoned trail that descends Charlotte Creek to join the Bubbs Creek trail. Proponents of this plan say that it will relieve the grazing and camping pressure on Junction Meadow and Vidette Meadow, as well as providing quick access to Rae Lakes and other points.

However, by closing Junction Meadow to grazing in 1960, we have gone a long way toward alleviating this pressure. The requirement that hay be packed by stock parties traveling up Bubbs Creek to Vidette Meadow should eventually solve most of the grazing difficulties. Reconstruction of this trail down Charlotte Creek, with the expense involved, is not warranted at this time, especially until there has been time to evaluate the results of other corrective proposals.

A serious adverse factor that would be introduced by rehabilitating the old Charlotte Creek trail would be the increased use, via Charlotte Creek, of Gardiner Basin, which for over 20 years has been considered the ultimate in wilderness remoteness and wilderness adventure. At the present time Gardiner Basin is barely holding its own as a true wilderness area. Visitation has increased; forage and fishing have begun to deteriorate. A trail on Charlotte Creek would pose a serious threat to this relatively undisturbed region, already threatened more than ever by the increasing use of nearby Charlotte Lake.

Fortunately, there is no constructed trail into Gardiner Basin, although it has always been possible for hikers and the more daring stock parties to gain access. Tying in a trail from Bubbs Creek to Charlotte Lake would certainly entice more people to attempt the trip into Gardiner Basin. It behooves us to explore all other possibilities that will relieve grazing and visitor use in certain critical areas before spreading unsolved problems into the last remnants of undeveloped wilderness.

The Committee recommends that Gardiner Basin be kept in as near a natural state as possible, and that to achieve this goal, no further work be programmed on the present Charlotte Lake trail beyond the proposed drift fence at the first meadow below the lake.

An excellent opportunity exists to utilize Gardiner Basin as a yardstick for comparing an unmodified area receiving minimum visitor use, with adjacent areas where comparable wilderness values existed prior to intensive public use, but which have now become modified in varying degrees. This goal can be achieved if no further work is done on the trail to Gardiner Pass, if the rough existing trail from the pass into the Basin is left unimproved, and if overnight grazing is prohibited.

In line with these protection measures, it is also recommended that no attempt be made to actively promote visitor use into Gardiner Basin. The thought here is that there should be areas that the visitor will hunt out on his own initiative (the existing trail can easily be followed) that will enable him to experience the oldtime wilderness atmosphere. Those who, preferring the comforts of a modified wilderness, do not venture into this area, will not be exerting damaging pressure on it. Those who do enter this basin may derive therefrom a new appreciation of the rare and special qualities of an unmodified wilderness.

In view of these considerations as to the ultimate consequences of new trail developments in this area, it is strongly recommended that proposed trail No. 116 (Charlotte Creek); and trail No. 117 (Gardiner Creek) be removed from the list of trails indicated for 'new construction."

The John Muir Trail skirts along and above the Rae Lakes, and should be maintained as a Class A trail. There are several dangerous places below Middle Rae Lake where the trail crosses slick rock. The surface should be roughened to prevent possible injury of people riding saddle horses.

Relocation of the starting point of the foot trail to Sixty Lake Basin is necessary to avoid further damage to a small meadow there. Further up the Sixty Lake Basin trail, serious trail erosion calls for a more substantial and effective means of trail drainage. After this work is performed it is recommended that, in order to preserve the essential wilderness atmosphere of this secluded area, no further work other than routine maintenance be programmed for this trail.

The grazing restrictions recommended along the Paradise Valley and Bubbs Creek trails may require a revision of the logistics programs of government trail crews. Trail use by visitors is heavy; work plans should call for early opening and inspection, but without damaging the limited and already endangered meadowlands through avoidable pressure by government stock.

9. Bridges

In the interest of public safety and convenience, some members of the Committee recommended that a simple log footbridge be provided at the junction of the Kings River and Woods Creek; and that a similar footbridge be provided at the main Woods Creek crossing.

The Committee recognized that foot travelers have for some 40 years been in the habit of finding their own natural down-log crossings, but that the Service is establishing a tradition of providing more of these conveniences. These particular crossings are hazardous during a normal spring runoff; in fact, the volume of water is considerable most of the season.

10. Signs

It is important that the visitor be advised of conditions and restrictions before starting this and other backcountry trips. Therefore, signs indicating grazing areas and restrictions, locations of trails serving this loop, developed campsites, approved camping practices, etc., should be placed at the various roadends and other starting points, as well as at appropriate locations along the trails. At major entrances this information could be supplemented by large maps of the entire loop, routed in wood, showing camping and grazing areas.

11. Firewood

Following the gradual disappearance of down firewood in the Rae Lakes region, visitors have begun to cut and hack to pieces the dead pine snags that are standing. These snags are, or were, magnificent scenery in their own right and are as much a part of the natural wilderness as the lakes and peaks.

It is likely that these gnarled snags would stand for 75 years, perhaps longer, if unmolested, but if the present trend is allowed to continue, eventually all of these snags will be gone and an essential part of this area will be lost.

The major danger appears to lie in the fact that some commercial packers and private stock parties, in their search for wood, have used chain saws to fell these monarchs, which would have been too robust for an axeman. It is obvious from the examples of indiscriminate cutting of trees at Rae Lakes that the use of chain saws by the public must be halted.

12. Staffing - Protection Patrols

Frequent patrols should be made from Cedar Grove up Bubbs Creek as far as Junction Meadow to check on visitor activities and to see that grazing restrictions are enforced.

Approximately 3,000 persons now use Kearsarge Pass annually as a means of entry to Kearsarge Basin and the Rae Lakes area. This number, plus the 3,000 - 4,000 visitors who enter annually by way of Cedar Grove, will continue to increase. Management plans should be geared to take care of current use and the still higher level that can be expected in the future.

It should be a definite responsibility of the ranger now stationed at Charlotte Lake to provide for protection at Vidette Meadow, and to enforce grazing and camping restrictions. When this ranger is on an extended patrol, these responsibilities could be assumed by the ranger proposed for location at Kearsarge Basin.

Proper management of the Kearsarge Basin-Charlotte Lake-Vidette Meadow area will require the assignment of a Seasonal Park Ranger to Kearsarge Basin during the travel season. Initial contact with all visitors, as well as area preservation, will be his major responsibility. The ranger assigned to the Basin can patrol this local area on foot and will therefore not require saddle or pack stock. Service and supply can be arranged through the commercial packers at Onion Valley, or through District Headquarters.

To assist the rangers at Charlotte Lake and Kearsarge Basin, it is recommended that a third ranger be assigned to the east side of the Sierra. This assignment would begin in early July and extend through Labor Day.

The responsibilities of this position would be to make initial contact with visitors about to enter the back country. At that time local regulations could be explained, questions concerning their trip answered, and itineraries of all large groups checked. This information could be relayed by FM radio to the rangers whose areas the groups would be visiting.

A pickup truck with a Camper top would provide sleeping and cooking accommodations for this ranger. His complete mobility would allow him to alternate between the east-side entrances of Onion Valley, Whitney Portal, and Bishop Pass.

Because of current camping and grazing demands at Charlotte Lake, and expected future use, it is recommended that the ranger now stationed there be continued at that location. However, in addition to his duties at Charlotte Lake, he will have to be responsible for Gardiner Basin, Center Basin, and East Lake. He will also maintain close liaison with the Kearsarge Basin ranger.

At the present time the Charlotte Lake ranger has a horse and mule for patrol purposes. His scope of responsibility will continue to require the use of this saddle and pack stock.

Adequate supervision of all visitor activities is the number one priority at Rae Lakes. This will require the assignment of one ranger to the immediate vicinity. His responsibilities should parallel those proposed for the protection of Kearsarge Basin.

The Rae Lakes ranger would patrol the Rae Lakes area and Sixty Lake Basin, with occasional visits to Dragon Lake. It would not be necessary to assign pack or saddle stock to this ranger because he should patrol the area on foot. Supplies and materials could be brought in from Cedar Grove or Onion Valley. A radio should be provided for communication with district headquarters.

The area from Rae Lakes through Paradise Valley receives very little protection although large numbers of people use the South Fork and John Muir Trails. At the present time this area is visited once or twice a month by the ranger assigned to patrol the Upper Basin area. The Committee feels that this is not often enough, considering the requirements of current travel and visitor use, the fire potential, and the protection so badly needed by the meadows.

The patrol of Upper Basin is extremely important and no time can be spared from this patrol to adequately cover and provide protection elsewhere. Therefore it is recommended that either a ranger or a fire-control aid be assigned to patrol Paradise Valley up to Woods Creek. It is suggested that this be a backpack patrol, since the terrain lends itself to easy walking.

Although walking patrols have not been common in Sequoia and Kings Canyon National Parks, they have worked well at Crabtree Meadow and a few other areas, and have been in operation in some other Parks. They would be particularly appropriate to this particular situation where forage for livestock has been nearly destroyed. A ten-day tour of duty with four days off is recommended. If funds should not be available to schedule a separate patrol along Bubbs Creek, it is suggested that this ranger alternate between the two areas.

13. Structures

It is proposed to construct in the general vicinity of Bullfrog Lake in Kearsarge Basin, a 10 x 12 tentframe that will serve as a ranger station and public contact point. The exact site should be selected by the District Park Ranger, with due regard to the fragile ecology of the immediate lake shore. This structure should be a duplicate of an existing station constructed in 1959 at Le Conte Canyon.

The 10 x 12 tentframe ranger station has proven satisfactory for short-season occupancy in the back country. Another advantage of this type of station is that if there is a change of travel pattern, or if administrative plans for area management need to be revised, it is a simple and inexpensive matter to dismantle the station for a move elsewhere.

Other advantages of this type of short-season ranger station are that it only slightly infringes on wilderness atmosphere, and does not have the biological consequences associated with more elaborate, costly and permanent structures.

The ranger's cooking needs at such a station can be met by a gasoline stove. Heating could be accomplished by a small kerosene stove, or other special fuel-burning types now available. Over-winter storage facilities will be necessary for protection of equipment kept permanently at this station.

If and when permanent buildings are found to be absolutely essential for certain other back-country ranger stations, the Committee recommends that prefabricated materials be considered instead of log construction. Prefabricated buildings of plywood or metal do not deplete the very sparse timber reserves of the high country as log construction does. They could be brought into the area by helicopter and set up quickly.

At Charlotte Lake the present ranger station is a one-room State snow-survey cabin, built in 1954. Since the cabin is there, not much can be done now to improve its living features. If future cabins of this type are to be placed in the back country for snow-survey purposes, they should be so designed that they will be suitable for summer occupancy by ranger personnel.

At Rae Lakes, a 10 x 12 tentframe is recommended to serve as a ranger station and living quarters. This type of one-man headquarters has proved suitable at Le Conte Canyon, and its numerous advantages have been described elsewhere in this report. Facilities for storage will be needed; they should be substantially constructed if supplies are to be left over the winter.

The station should be in the vicinity of Middle Rae Lake, close to available water from a developed spring if possible. The scarcity of firewood will require that cooking be done by gasoline stove; in addition, heating should be provided for comfort, but fuel will have to be used sparingly. Some firewood can be hauled in from the downstream area of needleminer-killed lodgepole pine near Baxter Creek. A small comfort station will be necessary.

This station should be manned from the first week of July through Labor Day.

14. Special Measures--Removal of Tree and Weed Invasions

It is recommended that special restoration treatment be given to Castle Dome Meadow. Since the present extensive weed and tree invasions in this meadow have been caused by grazing, eradication of the unnatural plant invasions to compensate for man's use is justified. Although a large-scale eradication program may not be necessary, limited removal of invading trees would appear advisable. This should be done as soon as possible, before the trees become too large to be handled economically. In addition to limited eradication of invading non-native plants, it is recommended that native grasses be used to re-seed this meadow.

Special treatment likewise is recommended for the meadows in Paradise Valley. This treatment should include eradication of limited, unnatural invasions of false hellebore, removal of invading trees, and steps to effectively plug the erosion gully in Lower Meadow.

15. Interpretation

A detailed trail guide is needed for the Rae Lakes Loop. This publication should indicate scenic spots along the route, camping restrictions and good camping spots, grazing restrictions and alternate grazing sites, good back-country practices, mileages between points, etc.; and should briefly give the story of the area's geology.

This guide could be sent to people inquiring about the Rae Lakes Loop, and could be placed in "Take One" boxes at Onion Valley and at Road's End. It would be an effective medium for calling attention to conservation problems along the loop, and should help to secure compliance with rules through education.

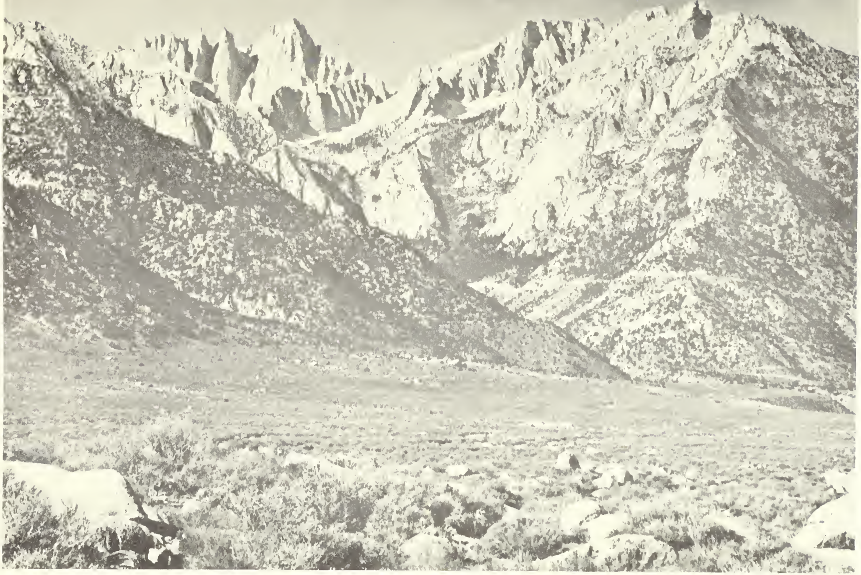


Fig. 19. Mount Whitney from the East Side

Whitney Portal is 10 miles west of Lone Pine and is easily reached by the well-paved spur road seen in the righthand corner.

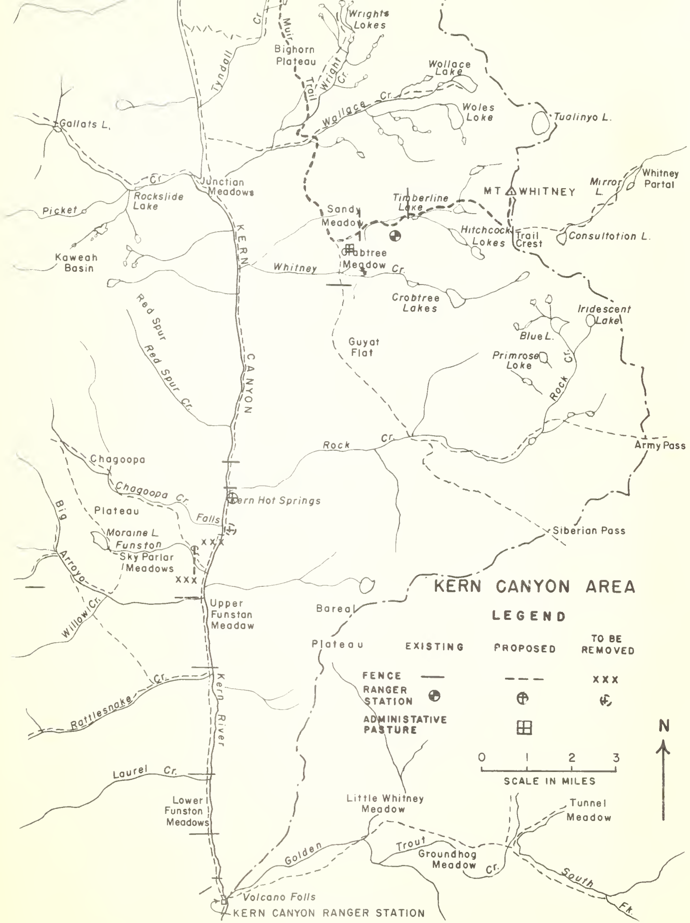


Fig. 20. Kern Canyon - Mt. Whitney Management Plan Map

THE KERN CANYON - MOUNT WHITNEY REGION

In this section, selections from the Committee's detailed management recommendations are presented. Situations and recommendations which are similar to those discussed previously in this report have been omitted.

Introduction

Travel to the Upper Kern areas increased noticeably in 1959. Whether this travel increase was due to an article that appeared in a national magazine that previous winter is not certain. In addition to this publicity there have been increased efforts on the part of Owens Valley residents to promote an annual hiking marathon from Whitney Portal, ten miles outside the Park, to the summit of Mount Whitney. This footrace usually is held in September to attract people after the Labor Day weekend, or to extend their weekend stay.

It was noted by the Committee that unless strict control and a clear understanding is reached with promoters of the marathon, undesirable practices can result. For instance, in 1960, marks to designate mile points were painted with bright blue paint on rocks along the Whitney Trail.

These two instances are cited to illustrate how general publicity can act as a detriment to park values, unless controls are devised.

Most commercial pack outfits build their business by publicizing the fishing opportunities, and their operation hinges to a great degree on whether or not good fishing is available. With few exceptions, where good fishing is accessible to stock parties, grazing problems, or improper campsite developments result; occasionally both problems occur simultaneously.

At Timberline Lake, on the John Muir Trail not far from the summit of Mt. Whitney, damage from grazing and camping became as severe as at Bullfrog Lake. This has forced the parks to close this area to all camping and grazing since 1959.

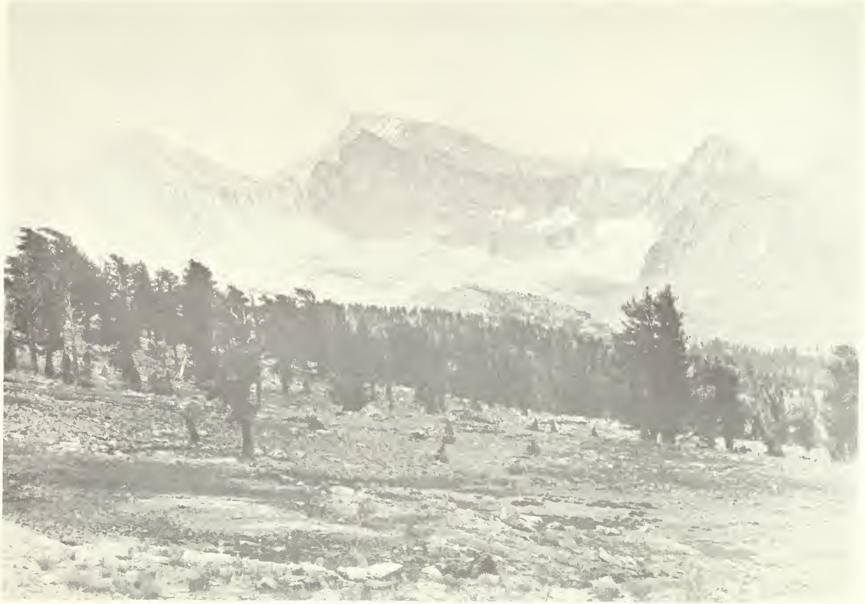


Fig. 21. Mount Whitney

This area features high mountain lakes, extensive benches and mesas, canyons, and lonely basins.

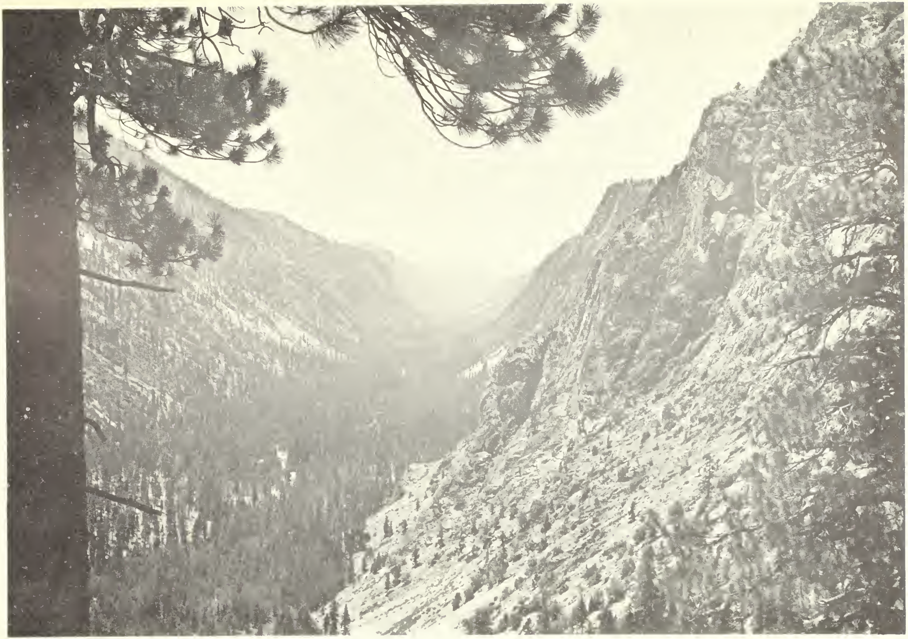


Fig. 22. Kern Canyon is a glaciated gorge 20 miles long, a mile wide from rim to rim, and 2000 to 2500 feet deep. Camping opportunities are excellent.

Description

Kern Canyon is a glaciated gorge 20 miles long, a mile wide from rim to rim, and 2,000 to 2,500 feet deep. Visitors to this area can camp at comfortable elevations from 6,500 feet to 8,000 feet in parklike groves of Jeffrey pine and incense cedar. They can fish for native Kern River rainbow in the open riffles and quiet pools of the broad river, which meanders between meadows. This canyon has long been a favorite of large stock parties, and many of these groups return year after year.

The vast Mount Whitney area comprises a plateau which bounds Kern Canyon. It ranges in elevation from near 9,500 feet at Rock Creek to 14,496 feet at the Whitney summit, and includes high mountain lakes, extensive benches and mesas, canyons, and lonely basins. The area is popular with backpackers as well as with large groups. Annual visitation exceeds 9,000 persons.

There is excellent fishing in most portions of the Kern - Mount Whitney region. Many of the lakes, and a number of streams, support golden trout. This good fishing brings numerous stock parties to the high lakes and streams. About 95 percent of the stock parties visiting this area fish not just for two or three days but for periods of ten days to two weeks.

Management Objectives

Establish guidelines for the protection of Mount Whitney from commercial exploitation by individuals or groups. Manipulate the fishing activity in certain waters as a means of dispersing the impact on the fragile wilderness environment by fishermen, particularly fishing parties with large numbers of stock.

Install directional signs only on trails that are an integral part of the Park's trail system and that are so designated in the Master Plan.

Recommendations

1. Grazing Regulations

Establish opening dates for grazing of all principal meadows in the Kern Canyon - Mount Whitney areas. Initiate a rotation of grazing use in the Funston Meadows.

2. Fishery Resource

It is recommended that fish planting be curtailed in all waters where it is obvious that fishing pressure has been instrumental in bringing about and maintaining severe damage by grazing or by other types of visitor use.

It is also recommended that stocking of fish be gradually reduced in areas now seldom visited, where a sudden influx of people and stock drawn by reports of good fishing could endanger the wilderness values. This does not mean that there should be a complete abandonment of the fish-planting program; but it does mean that if the parks are to reduce grazing pressures in the back country the management of fishery resources must be carefully coordinated with the protection of other park values.

A practical working plan might be to stock appropriate waters along certain trails that do not afford nearby camping or grazing opportunities, or where fishing would be compatible with wilderness objectives for that particular area. An unstocked zone would be extremely beneficial if immediately established at all currently severe problem areas, and in some other areas where wilderness values could be significantly threatened by any improvement of the existing fishery resource.

The presentation of numerous improved fishing opportunities along certain trails could be used as a tool to keep fishing parties moving and to deter them from settling for too long in some spot that is vulnerable to damage. For example, fishing opportunities appear to be good in the Forester Pass Lake (Fig. 11), in Wanda Lake and other lakes of Evolution Basin (Fig. 25), and in the lakes of Upper Basin (Fig. 23). These are all highly scenic areas, but they are too high and cold, and lacking in firewood, for comfortable camping; consequently, stock parties tend to overlook the fishing opportunities in these lakes.

Management should consider the further improvement and even local publicizing of fishing in such areas while tapering off on severely damaged areas where, if there is good fishing, the visitors' attitude is frequently, "Why go on--fishing is good here." Traveling trips, under the fishing conditions suggested, should appeal to the packers, because this is where much of the season's profit lies.

3. Signs

When properly worded and located, signs have obvious value for the back-country visitor. But some signs can be actually detrimental if made too conspicuous, and if placed where they will call attention to areas off the "beaten track" that would suffer severely from increased visitor use.

An example of improper sign placement occurs at Crabtree Meadows, near the base of Mount Whitney. Between the first and second meadow, a sign indicates the direction to Crabtree Lakes. Farther out, across the meadow, another sign repeats the same information. From this point to the lakes a well-beaten trail now exists through an area where there was little if any trail eight years ago. This trail, which now is followed by foot and stock parties, is not maintained by the parks, nor does it show on any official park map. Until a few years ago, when these trail signs were installed, very few people found their way to this remote basin. The lakes are on all the topographic maps, as they should be, and those persons who were interested in visiting them could have the enjoyment of searching them out with the aid of a map, which was not at all difficult to do.

The two signs have been instrumental in reducing this area to just another group of back-country lakes that are losing their wilderness character because they are visited by larger numbers of people than the limited area can support without damage. Placement of these signs and the resultant general publicity has hastened the discovery and saturation of the area.

4. Interpretation

The recommended management approach for the Kern Canyon - Mount Whitney region is to begin easing off on unsolicited publicity. In certain cases it may be necessary to discourage publicity that would tend to attract visitors to a severely damaged area, while at the same time encouraging publicity concerning the preservation and management of the area. This would help toward attaining the primary objectives of the Service and of visitors as well.

Evidence of saturation often can be evaluated in terms of current ecological deterioration, the effectiveness of administrative controls to date, and the number of years it is estimated that control will be required to reverse the deterioration.

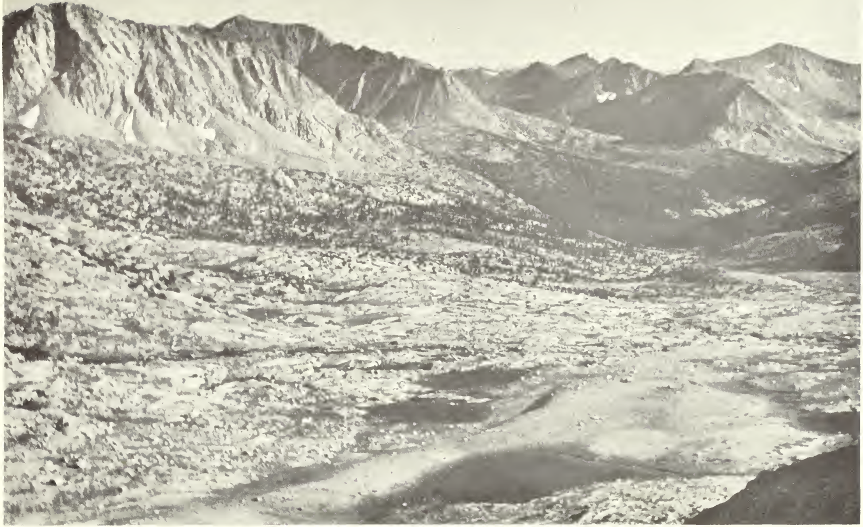


Fig. 23. Upper Basin

On the left and in the background lies Taboose Pass, the principal entrance to this area from the east side. In the foreground is a portion of the John Muir Trail.

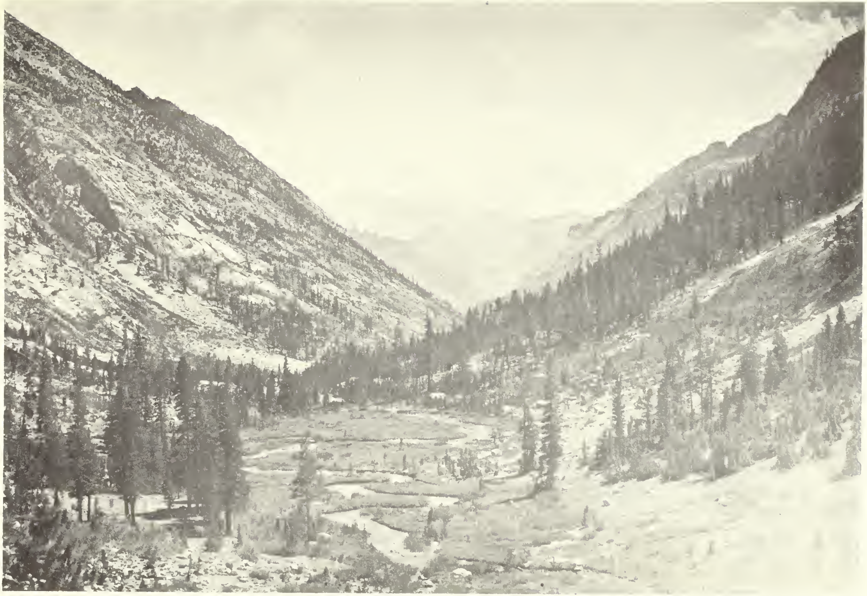


Fig. 24.

Le Conte Canyon

The Middle Fork Kings River meandering through Little Pete Meadow.

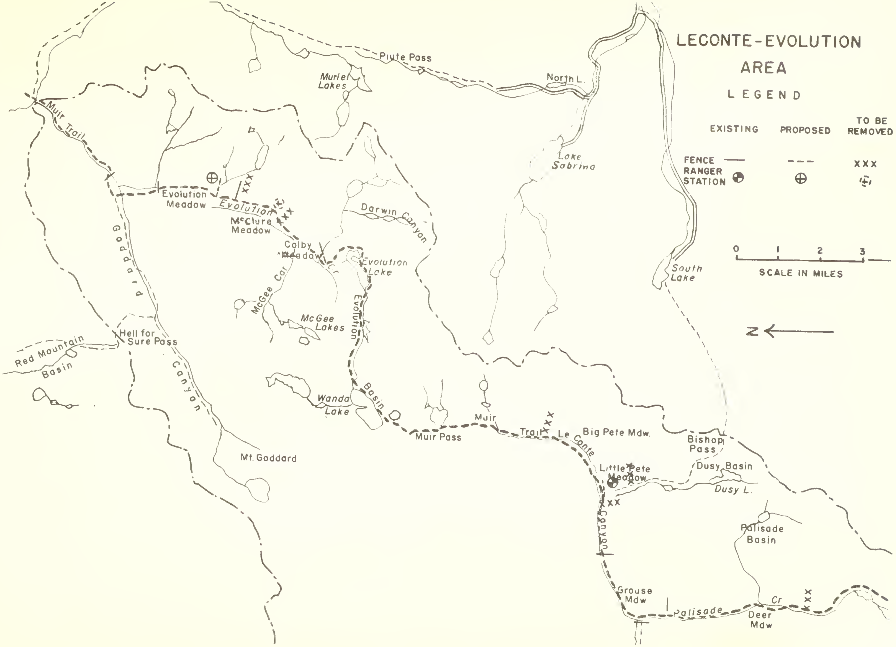


Fig. 25. Le Conte Canyon - Upper Basin - Evolution Regions - Management Plan Map

THE LE CONTE CANYON - UPPER BASIN - EVOLUTION REGIONS

Selections from the Committee's detailed management recommendations are presented here.

Introduction

The John Muir Trail traverses these regions and is the principal route over which most of the multitude of visitors reach the three regions mentioned. Annual attendance exceeds 4,000 persons. The major problems are control of grazing, rehabilitation of alpine meadows, and the various management efforts necessary to maintain adjacent areas in a wilderness state.

Description

The Le Conte Canyon, Upper Basin, and Evolution Valley back-country regions are well known and heavily visited. In these regions are spacious and beautiful amphitheaters, dominated by towering peaks and containing scenic lakes; there are deep, forested canyons, alpine meadows, and rushing streams. Access to these areas is over trails maintained by the Forest Service to junctions with National Park Service trails at the park-forest boundaries.

Management Objectives

1. Regulate spring grazing use of very wet meadows in accordance with their seasonal readiness.

2. Bring to a halt irreversible, unnatural invasions of lodgepoles.

3. Undertake management practices in McGee Canyon that are designed to restore the area and protect it from overuse.

4. To effectively reduce grazing pressure on meadows in Le Conte Canyon and Evolution Valley, program the use of aircraft for service and supply of government crews assigned to these areas.

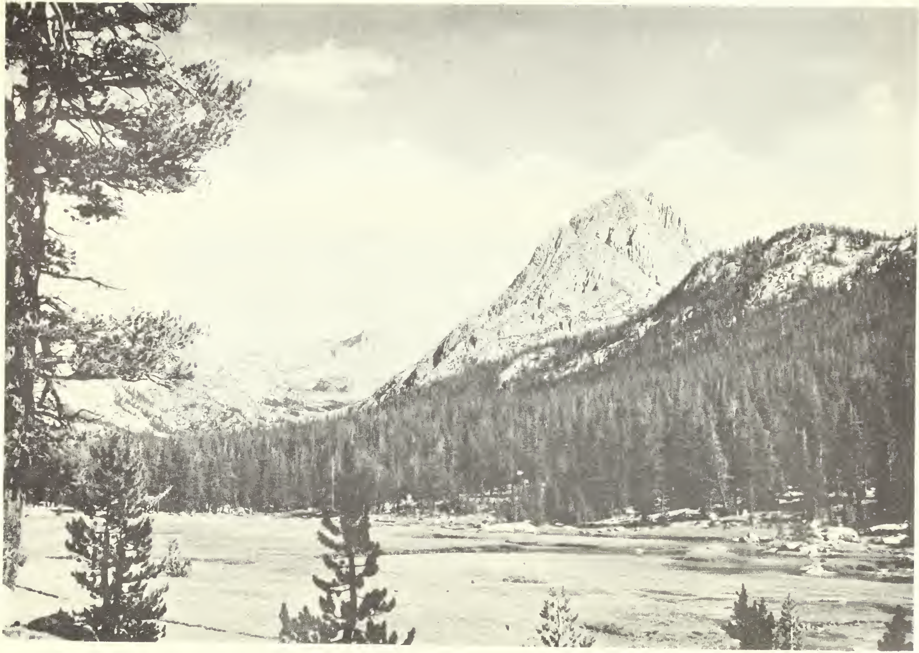
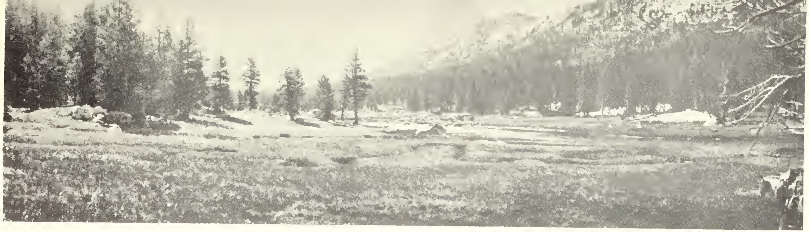
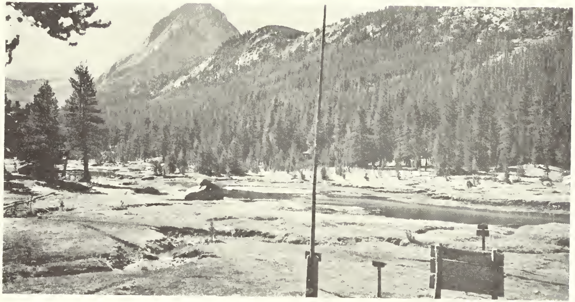


Fig. 26. In the shelter of the long well-timbered Evolution Valley, lies McClure Meadow.





Figs. 27. and 28.

McClure Meadow

The upper photography was taken in 1914, the lower photograph taken from approximately the same vantage point in 1960.

Note the advancement of lodgepole on the opposite side of the meadow as shown in the 1960 photograph, streambank erosion, over-grazed appearance of the meadow, and damage brought about by the improper location of the trail.

Conclusions and Recommendations

1. Grazing Regulations

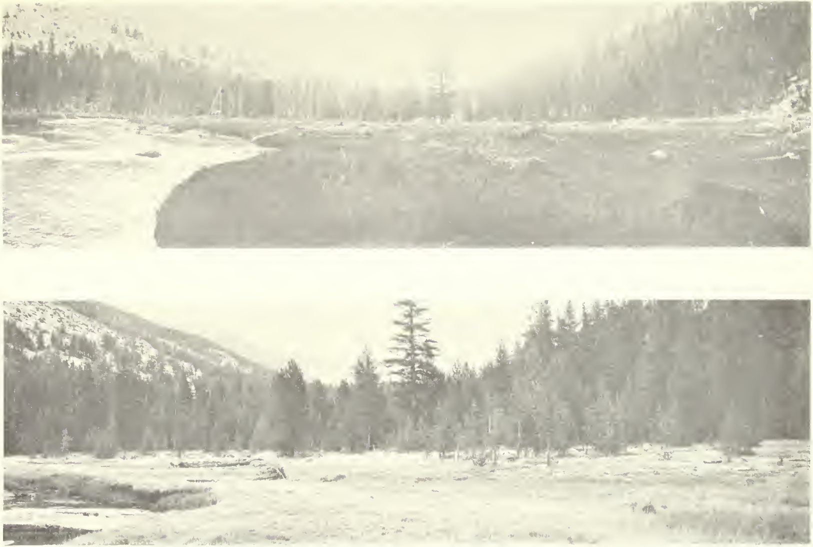
McClure Meadow, in Evolution Valley, is ideal for camping, because of its sheltered location and the abundance of wood and water (Fig. 26). But this meadow is susceptible to prolonged flooding and excessive wetness, and usually is not properly usable for stock until the middle of the travel season. As a result, it receives very heavy use just at a time when critical vegetative growth, long delayed by flooding, is taking place.

In high-altitude meadows that are subject to such flooding, the growing season commences about the first or second week of June and continues until about the end of August. Thus, there is a serious overlap of grazing use upon the vital growing season. The period when such meadows are most vulnerable to damage is from the first week of June until about July 15.

In 1960, grazing restrictions were applied to McClure Meadow, curtailing early-season use. The results were highly encouraging. Forage remained good, there was very little trampling, and no sign of overgrazing. These seasonal grazing restrictions should be continued. Until this meadow dries out and its forage matures sufficiently to withstand grazing, stock parties should be directed to Evolution Meadow and to the short-hair benches below the drift fence that separates McClure Meadow and Evolution Meadow. McClure and the adjacent Colby Meadow should be closed to grazing through July, with limited grazing thereafter.

An important means of relieving the grazing pressure on the meadows of Le Conte Canyon and Palisade Creek would be the reduced use of government stock. This can be accomplished by a reappraisal of stock requirements not only for ranger personnel but for other government crews working in these areas. The District Ranger and other protection personnel familiar with the terrain and the responsibilities assigned to the Le Conte ranger have agreed that the ranger in Le Conte Canyon could adequately perform his duties on foot rather than horseback.

As an aid to better trail management and as a means of reducing severe overgrazing in this portion of Kings Canyon National Park, it has been recommended that trail crews be packed in, and moved from place to place, by commercial packers. This



Figs. 29. and 30. Evolution Meadow

Evolution Meadow as it appeared in 1914, and its appearance in 1960. Notice how the lodgepole has advanced into meadow (use central tree for reference point). Notice difference in distance between edge of forest and rock in right foreground of meadow.

arrangement would eliminate the need for excessive numbers of government stock that in the past have been brought into the area and held there for weeks at a time.

These two suggestions will require some revision of the logistics programs for government crews assigned to Le Conte Canyon and Evolution Valley, but are believed to be practical.

In view of the proven damage to meadows in this area by excessive numbers of stock, airdrops of government supplies in lieu of pack strings appear warranted. It is believed that these drops could usually be worked in with routine administrative flights, and thus not increase by any appreciable degree the number of flights normally made over the parks.

It is recognized that until the noise factor can be significantly lowered, use of the helicopter in the back country will have to be justified primarily on the basis of emergency conditions. Unusually severe damage to natural values by livestock might be considered an emergency situation under certain extreme conditions in locations where transportation by stock is the only alternative method of transportation.

In any case, the grazing situation is so precarious in all meadows of Le Conte Canyon that it behooves the parks to keep government use of these meadows to an absolute minimum.

2. Special Measures--Removal of Tree and Weed Invasions

Lodgepole invasion of McClure Meadow is heavy. Figs. 27 and 28 clearly indicate the dramatic change between the time the first photograph was taken in 1914, and 1960, when a comparison photograph was taken. Invasion by these trees undoubtedly was promoted and accelerated by overgrazing (see references in this report to previous studies). The invasion must be halted now, before the trees grow so large that removal costs become prohibitive.

Nearby, Evolution Meadow exhibits the same type of progressive invasion of lodgepoles (Figs. 29 and 30). This invasion was noted by Sumner in 1941 and undoubtedly is caused by grazing pressure, aggravated by a natural trend toward increasing dryness. The large number of small trees noted in 1941 have now reached a height of 15-20 feet, and since that time succeeding generations of young lodgepole also have sprung up. This new invasion is relatively meager, with growth of the most recent invaders generally suppressed, owing to a release of the meadow from earlier heavy grazing pressure.

If this current invasion is not halted, and the older trees are not removed before they reach a size that would preclude economical removal, McClure, Evolution, and particularly McGee Meadows eventually may become entirely replaced by a lodgepole forest. This would be clearly contrary to the mandate to preserve these areas unimpaired for future generations.

3. McGee Canyon--A Special Problem

McGee Canyon, two miles south of Colby Meadow in Evolution Valley, has long been a favorite retreat for large groups who prefer to camp well away from the congestion of other visitors. A rough, unimproved spur trail branches off from the John Muir Trail to this area. It is a typically nonengineered oldtime trail--just a way up through the rocks, but entirely adequate.

McGee Canyon has been used as an overflow and dispersal area for 17 years, and clearly illustrates what happens when a solution is not worked out for an overused area (Evolution Valley), with an attempt, instead, to solve the problem by spreading the overuse into an adjacent, previously unspoiled, area.

In 1952 a drift fence was installed to hold overflow stock in McGee Canyon. Even before that time there had been increasing overgrazing in this canyon, as shown by the older of the successive generations of young lodgepole that have invaded the meadow. After the drift fence was installed in McGee Canyon, the lodgepole made a sudden spurt in growth. All ages are now represented in a steadily increasing growth of these young trees, which have taken over nearly the entire meadow area. In some places these young trees form such dense patches that it can clearly be predicted that, unless corrective measures are taken promptly, in a few years an impenetrable forest will replace the open meadow (Fig. 6).

It is questionable whether large groups with stock, such as the Sierra Club Base Camp, can use McGee Canyon in the foreseeable future without significant damage, in view of its present condition. It is strongly recommended that any large groups with 12 head or more of stock, who indicate through a previously submitted itinerary that they plan to camp in McGee Canyon, be required to pack hay for their stock. To conserve firewood, cooking by such groups should be done on gasoline stoves. This information should be included in all Special Use Permits that are issued to commercial pack stations operating in these parks.

It is recommended that the wilderness qualities of McGee Canyon be given special recognition, as in the case of Sixty Lake Basin and Gardiner Basin of the Rae Lakes Loop. Accordingly, the rough, unimproved spur trail that branches off the John Muir Trail to this canyon should be left in its present condition, as it is entirely adequate. Signs pointing to the area should be small and should be inconspicuously placed so as to serve primarily the visitor who is already on the lookout for this area, rather than serving as a come-on advertisement to those who previously had no thought of going there.

The McGee Lakes should not be stocked with fish, as this would only tend to intensify the present use of this area. It is a well-established fact that a major proportion of meadow damage by livestock is caused by stock parties whose travel routes and lengths of stay are largely determined by the fact that they are fishermen.

It is hoped that the guidelines offered in Part I of this report will be of value to the administrator when he deals with problems such as those found in McGee Canyon. The Committee has not recommended sudden or drastic solutions for this area but feels that in areas where the traditionally large groups now present a hazard to wilderness ecology, new adjustments must be made to fit today's new conditions.

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